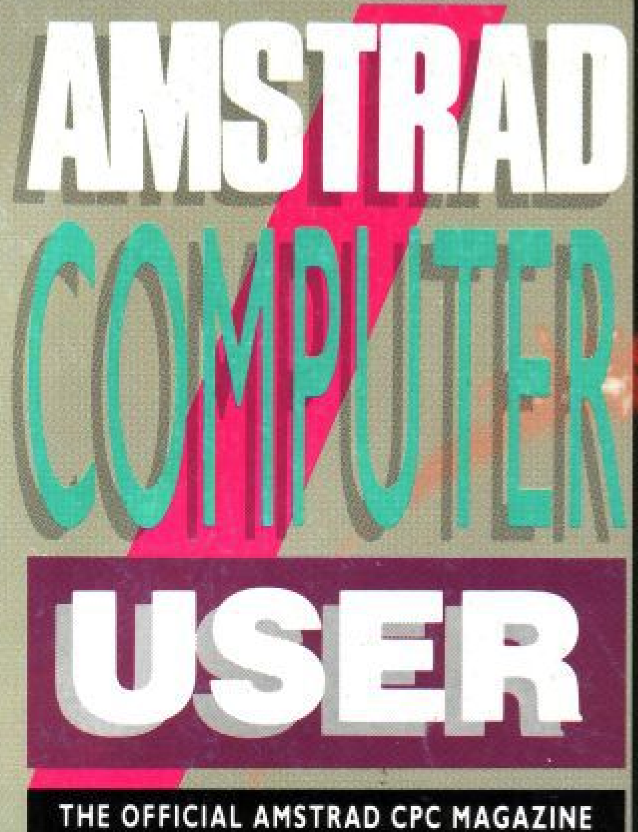


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COMPETITION NEWS

FOUR WINNERS ANNOUNCED

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ALL NEW GAME SECTION
REVIEWS TETRIS, HIT SQUAD, OBLITERATOR, MOTORCROSS SIMULATOR AND MORE

THE REGULARS

AUNTIE JOHN, COMBAT ZONE, APPLICATIONS ADVICE, MICRO-SCOPE, BUT WHERE IS THE HACKER?



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RENEGADE
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ARKANOID
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ACE – "Incredibly frustrating playable and addictive."

ARKANOID REVENGE OF DOH
AMTIX – "Excellent – can't fault it. A future number one."
YOUR SINCLAIR – "Immensely impressive and chronically addictive. A Classic."

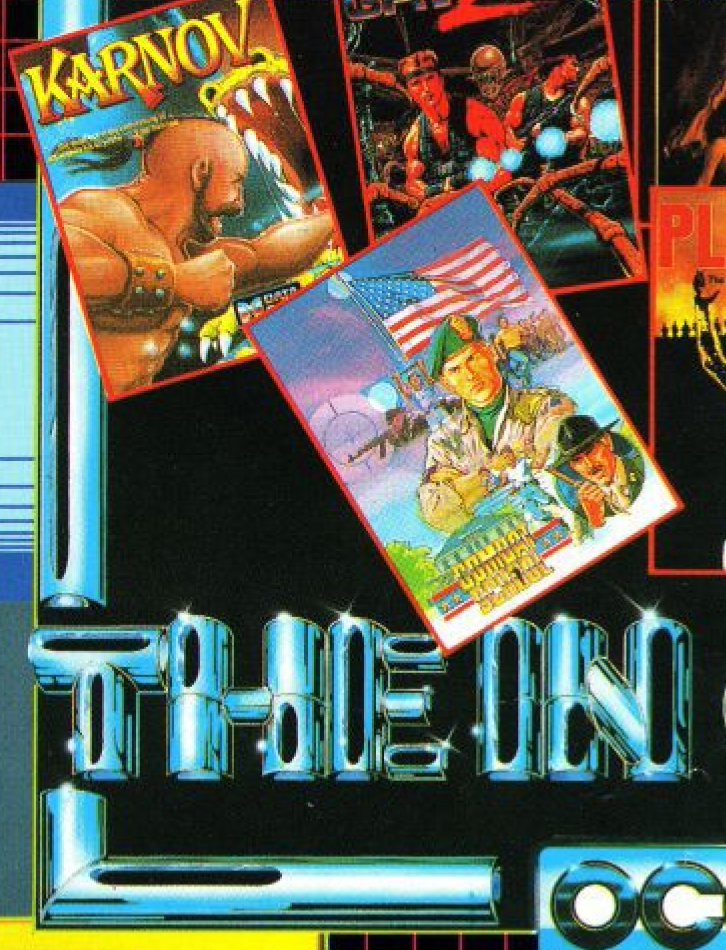
BUBBLE BOBBLE
AMSTRAD ACTION – "It's a cracker. Definitely a game I should keep coming back to."
GAMES MACHINE – "Packed to the brim with entertainment."

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CRASH – "One I won't put down until I get through to the next level."











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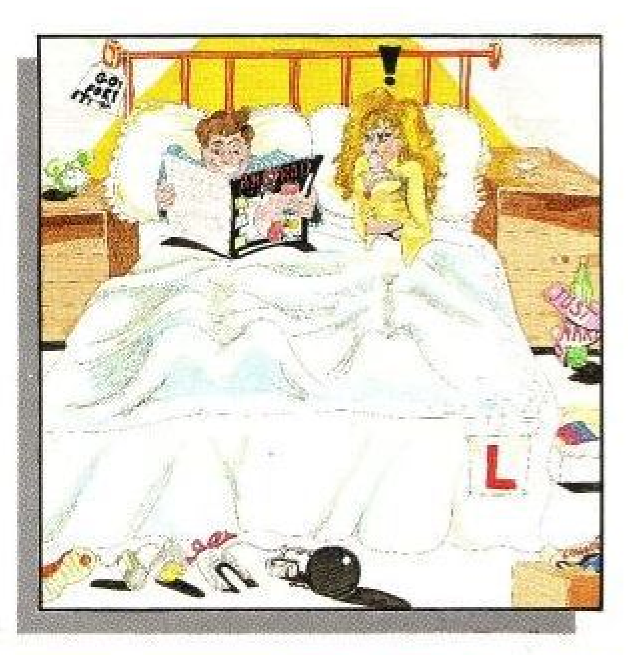
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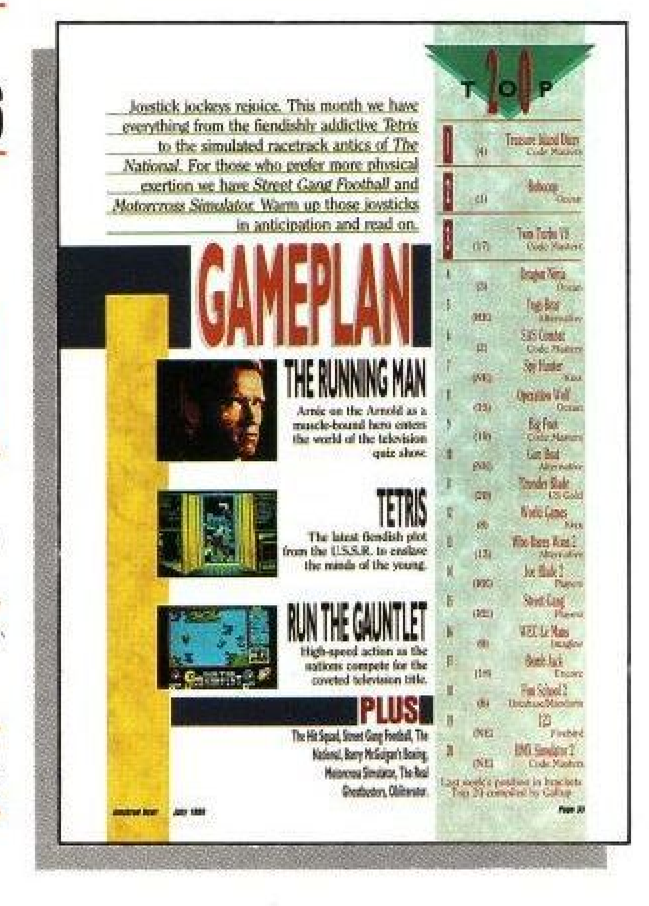
CONTENTS

REGULARS

COMPETITION



FEATURES



Joystick jockeys rejoice. This month we have everything from the fiendishly addictive *Tetris* to the simulated racetrack antics of *The National*. For those who prefer more physical exertion we have *Street Gang Football* and *Motorcross Simulator*. Warm up those joysticks in anticipation and read on.

GAMEPLAN

THE RUNNING MAN

Arnie on the Arnold as a muscle-bound hero enters the world of the television quiz show.

TETRIS

The latest fiendish plot from the U.S.S.R. to enslave the minds of the young.

RUN THE GAUNTLET

High-speed action as the nations compete for the coveted television title.

PLUS

The Hit Squad, Street Gang Football, The National, Barry McGuigan's Boxing, Motorcross Simulator, The Real Ghostbusters, Obliterator.

TOP 20

LETTERS



Revolutionary Suggestions

As a relative newcomer can I offer the following ideas?

a. While the programs in *ACU* each month are very good, the typing needed to enter them is very tedious. Would it be possible either to use a scanner on the text then, when it is on the screen, home a program to transfer it from the screen to memory for running? Or take a video picture of the page and somehow get it into memory for running that way.

An alternative idea would be to arrange a program so that as each line is typeset it produces automatically a bar code printed after it; this could then be read into the home computer. If it is feasible it would give a big boost to your magazine once a bar-reader were readily available.

In the ever-increasing search for more memory why does not a manufacturer produce a floppy disc to slide into a standard drive but having each track made up of circular IC memories? With modern technology it should be possible to put at least 1MB of memory on each track, thus giving the standard floppy disc an upgrade capability of 80MB. The mark-up would be enormous, as everybody with floppy discs could virtually turn them into Winchesters. If the memories were C-Mas a small built-in battery would provide the power.

Finally, a probem of my own. I have a 6128 with the Pace RS232 interface. I have double-checked all the connection and while the interface works satisfactorily I find it impossible to switch it off-line every time I press control 4. I just get a bleep even when nothing else is connected to the interface.

J.K. Eley,
Glenfield,
Leicester.

ACU: Using a text scanner would be the easiest of the two options and the software needed to turn the text into a viable program should be relatively simple. I look forward to viewing your solution.

Have you ever tried to debug a bar code?

Increased storage capacity would reduce demand for discs. That, in turn, would increase the prices. Would we be any better off?

Have you tried threatening it?

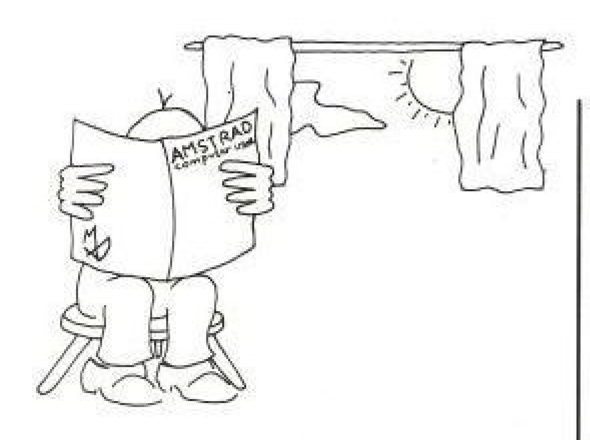
10-Liner blues

In the April issue I typed-in the 10-Liner *Sound Effects*. I thought it was great but it did not work.

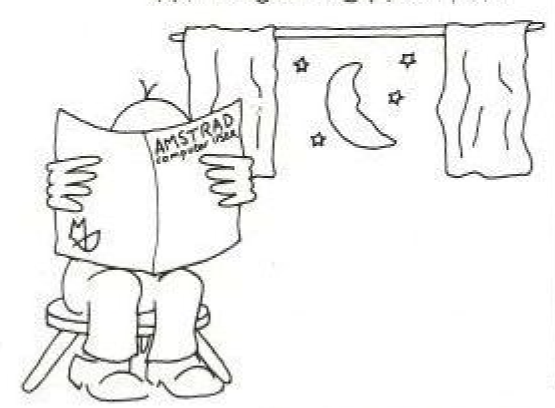
In the May issue *Meteor Storms* did not work. It just kept saying "Data Exhausted At Line 30". The 10-Liner called *Wordsearcher* in the same edition worked brilliantly.

Paul Collard
Worthing

ACU: We test all the programs before we print them and try our best to make sure that no mistakes enter during a listings transition to printed page.



A.M. SATISFACTION



P.M. SATISFACTION

M. Madden. Competition runner-up.

Help at hand

I see that R.J.D. Hartley of Merseyside is having difficulty in obtaining a copy of the firmwave specification for the 6128, Soft 968. I have a copy which was bought for me in error. It is in pristine condition and Hartley may have it if he wishes for £19 plus postage.

Many thanks for a fine magazine with more interesting articles. I look forward eagerly to ensuing articles on Fractal Landscapes.

Alan Clayton,
Barningham Rectory,
Richmond,
North Yorkshire,
DL11 7DW.

Getting started

I am writing an adventuer using the GAC and I hope to market it myself for about £4 but I do not know how to go about getting a copyright and I am not sure how much it will cost. I would also like to know how to let computer shops know about it; is there another way apart from writing to each one individually?

Simon Goodson,
Tiptree,
Essex.

ACU: Distributing your game through the shops is an expensive business. Not only must you promote your product but you must also pay for duplication and packaging costs - no small sum. You have two options. You could sell your game via mail order, thus reducing some of the overheads but not all, or you could approach one of the major publishers.

One method of safeguarding your rights is to place a copy of your game in a bank vault in a sealed envelope. That will enable you to prove your claims on the game at a later date. For further details visit your local bank.

Type it yourself

The article *Type it yourself* in the May issue was very interesting. Thomas Betts seems to be surprised, however, by the variable name beginning 11 0 0. There is no mystery. This is the indication that the variable whose name follows is integer *by default* i.e., by virtue of a previous defint statement.

Similarly 12 0 0 is the indication that the following variable is a string type because of a defste statement. If there is no defint or defstr statement the default for all variables is real. Any variable name not marked with % or $ appears after bein tokenised as 13 0 0. The little routine will illustrate this, if it is entered by typing "run 65000".

The Activision Hot Line number is 0734 310003, not 0734 311003.

```
1510 aa%=4
20 aa!=5
30 aa$="6"
40 DEFINT j:DEFSTR b
50 jj=9
60 aaa=7
70 bb="8"
80 '
65000 start=368:linum=0
65010 WHILE linum<80
65020 length=PEEK(start)+256*PEEK(start+1)
65030 linum=PEEK(start+2)+256*PEEK(start+3)
65040 PRINT:PRINT linum;
65050 FOR i=start+4 TO start + length-1
65060 PRINT USING "####";PEEK(i);:NEXT
65070 start=start + length:WEND:PRINT
65080 IF jj<>9 THEN RUN ELSE END

run 65000


 10    2   0   0  97 225 239  18   0
 20    4   0   0  97 225 239  19   0
 30    3   0   0  97 225 239  34  54  34   0
 40  142  32 106   1 144  32  98   0
 50   13   0   0 106 234 239  23   0
 60   13   0   0  97  97 225 239  21   0
 70   13   0   0  98 226 239  34  56  34   0
 80    1 192   0

 10    2   6   0  97 225 239  18   0
 20    4  13   0  97 225 239  19   0
 30    3  23   0  97 225 239  34  54  34   0
 40  142  32 106   1 144  32  98   0
 50   11  31   0 106 234 239  23   0
 60   13  39   0  97  97 225 239  21   0
 70   12  49   0  98 226 239  34  56  34   0
 80    1 192   0
```

Anonymous runner-up. Apologies, but it was a good play on words.

What's in a name

Although I have owned an Amstrad CPC 6128 for a number of years, friends keep asking me what does the CPC and the 6 stand for in CPC6128?

Andrew Fisher
Spalding,
Lincs.

ACU: If the number selected is greater than the number on the previous model and smaller than the number on the next model, then it is correct. As for its meaning, how long is a piece of string?

Basic training

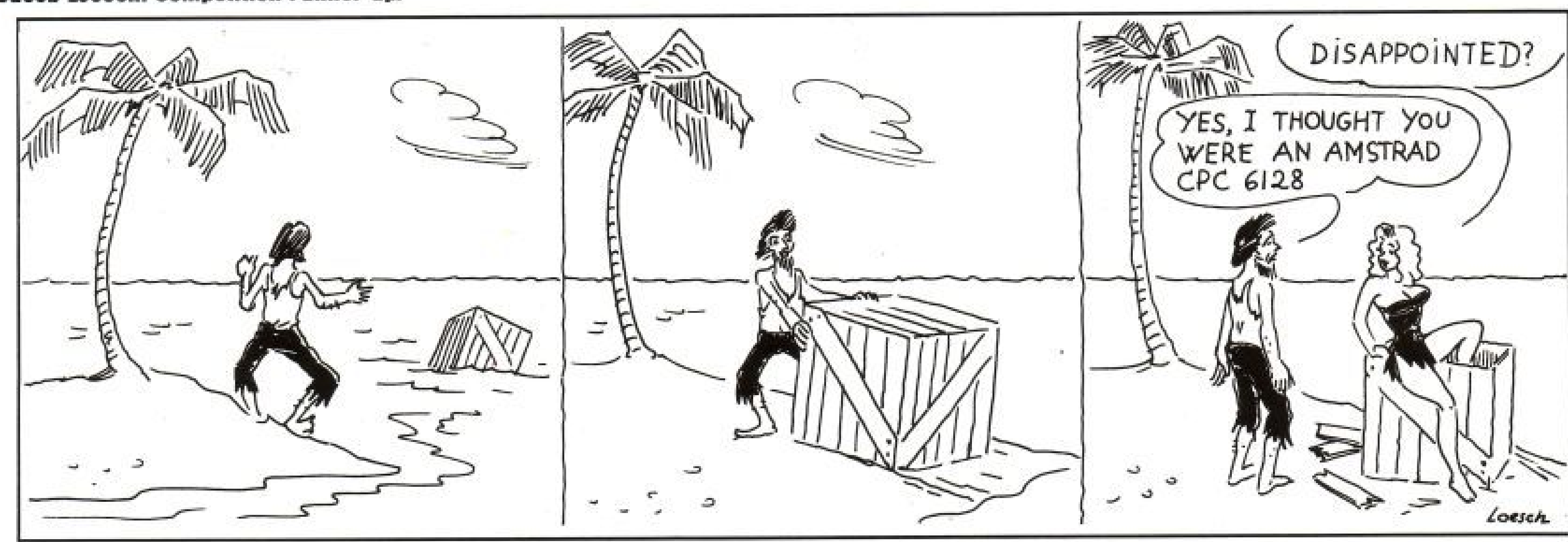
I brought the last two copies of *ACU* but most of the articles I do not understand as I am only a beginner. I would like my children and myself to try programming, instead of just playing games all the time. How about a page for beginners every month which we can follow and progress? It would certainly be beneficial in getting my children interested.

Just one more thing. I like the 10-Liners but in the last issue, in *Meteor Storm*, I got an inproper argument in 30 and *Arcade Tennis*, Syntax Error in line 70. What can I do to correct them when I do not have a clue what I am doing?

K. Worrall,
Stoke,
Coventry.

ACU: Greater care will be taken to ensure that all the 10-Liners are error-free before they go to press. As for a page aimed at beginners, it seems a good idea.

Jacob Loesch. Competition runner-up.




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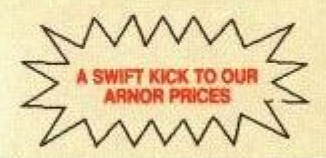
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JUST WHEN YOU THOUGHT IT WAS SAFE...

THE 1970s fishy horror movie, *Jaws*, is finally to make its way to the home computer. It will be the first release from new software company Screen 7, which plans many exciting products for the coming months.

Jaws is one of the greatest box office attractions in the history of motion pictures. Directed by Steven Spielberg. It starred Rod Steiger as a police chief with the task of killing a maniac shark. You play Police Chief Brody in his quest to rid the waters from this rubbery terror.

Two colleagues of yours have been hired to help you retrieve some lethal weapons from the seabed and kill the unwelcome intruder and, unless you destroy the beast soon, you could find yourself without a job, or legs or both. Jaws will cost £9.99 for the CPC cassette, £14.99 for disc.

By uncanny coincidence the next Screen 7 release will be titled *Steigar*, but having nothing to do with the actor. It is an action-packed arcade blast featuring a mercenary helicopter pilot. *High Steel* is also expected around June and is about the big business of skyscraper construction.

LICENCED TO BE LICENCED

DOMARK, the company founded by Dominic Wheatley and Mark Strachan in the first half of 1984, has announced the fourth of its games to involve that most macho of all superspies, James Bond.

In *Licence to Kill*, the second of the Bond movies to feature Timothy Dalton, 007 plays his toughest role yet. When he sets out on a personal vendetta against drugs magnate Sanchez, things get rather hairy and certainly hard-hitting to bring the Ian Fleming character into the 1980s.

The computer game follows the film as closely as possible. Both feature stunning helicopter chases, shark-dodging water scenes and a race to catch Sanchez while he tries to cross the border with a large consignment of drugs. Licence to Kthey are to Kill will he released in June on tape and disc.

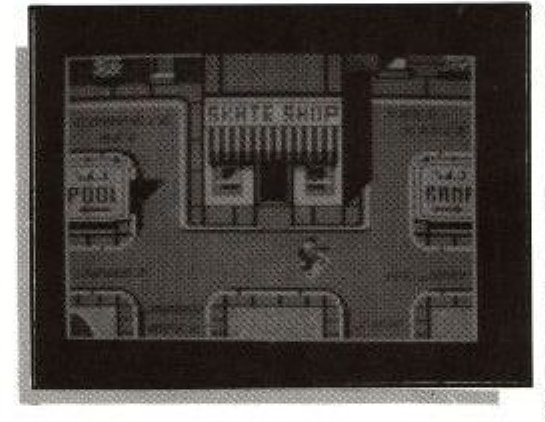
Domark has also recently signed a distribution contract with American software house Broderbund. The first two games to result are *Wings of Fury*, a fast action flight simulation – and *The Ancient Art of War*, a wargame which allows you to pit your wits against the likes of Ghengis Khan and Alexander the Great. Both will be available in the next 12 months.

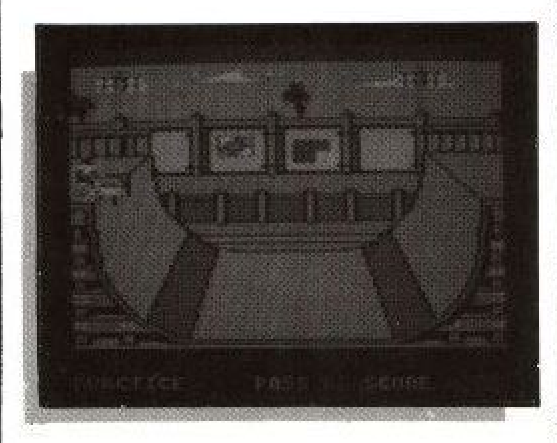
The subsidiary label, Tengen, has also announced new releases. *Xybots*, *APB*, *Toobin'* and *Dragon Spirit* have all been well-documented previously but it is the announcement that it is to convert *Hard Drivin*, the most popular and most realistic arcade car racing game invented, to home computer format which is possibly the most exciting.

Bob's *Full House* is also finally set for an appearance, now that Bob Monkhouse has signed a deal and the obscure board game *Pictionary* will be pixelised, too, towards the end of the year.









SALT WATER SKIRMISH

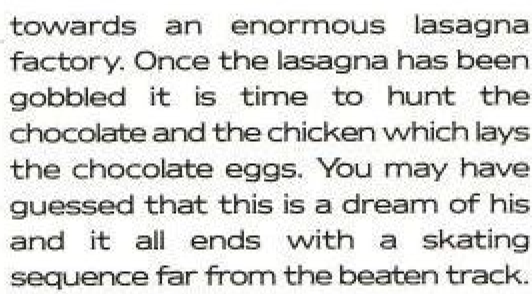
ELECTRONIC ARTS is to release the sequel to the popular Ocean game, *Army Moves*. Entitled *Navy Moves*, the game hopes to emulate the success of its predecessor. Written by Dinamic, Navy Moves is a game in two separate parts, with four combat areas to be negotiated. It places the player in a rather awkward position; you must destroy a U-5544 nuclear submarine or the world could be Kentucky-fried before you know it. The game will be available in early June for £9.95 for tape and £14.95 for the disc version.

Another launch by Electronic Arts is *The Software Classics*, a range of re-released games at budget prices. First will be *The Bard's Tale*, *Arctic Fox* and *The Archon Collection*, all at £2.99 tape, £6.99 disc.

Also the long-awaited *Skate or Die* is finally near completion and should be with us in the near future.

COMIC BOOK CAPERS

THE Softek subsidiary labél, The Edge, has two big licences planned for autumn. The first is the second game featuring that lovable, furry, pizza-eating cat which can be found stuck to many car windows round the world, Garfield. *In Winter's Tail*, Garfield becomes a ski animal when he must be guided down the slopes



towards an enormous lasagna factory. Once the lasagna has been gobbled it is time to hunt the chocolate and the chicken which lays the chocolate eggs. You may have guessed that this is a dream of his and it all ends with a skating sequence far from the beaten track.

The *Uncanny X-Men* is also a game to be reckoned with. Based on the popular *Marvel* comic, it features a mutant super-hero group with weird and wonderful powers. There are three games targeted, with one of them based solely on the most favourite of mutants, Wolverine, da guy wit de big adamantium claws.



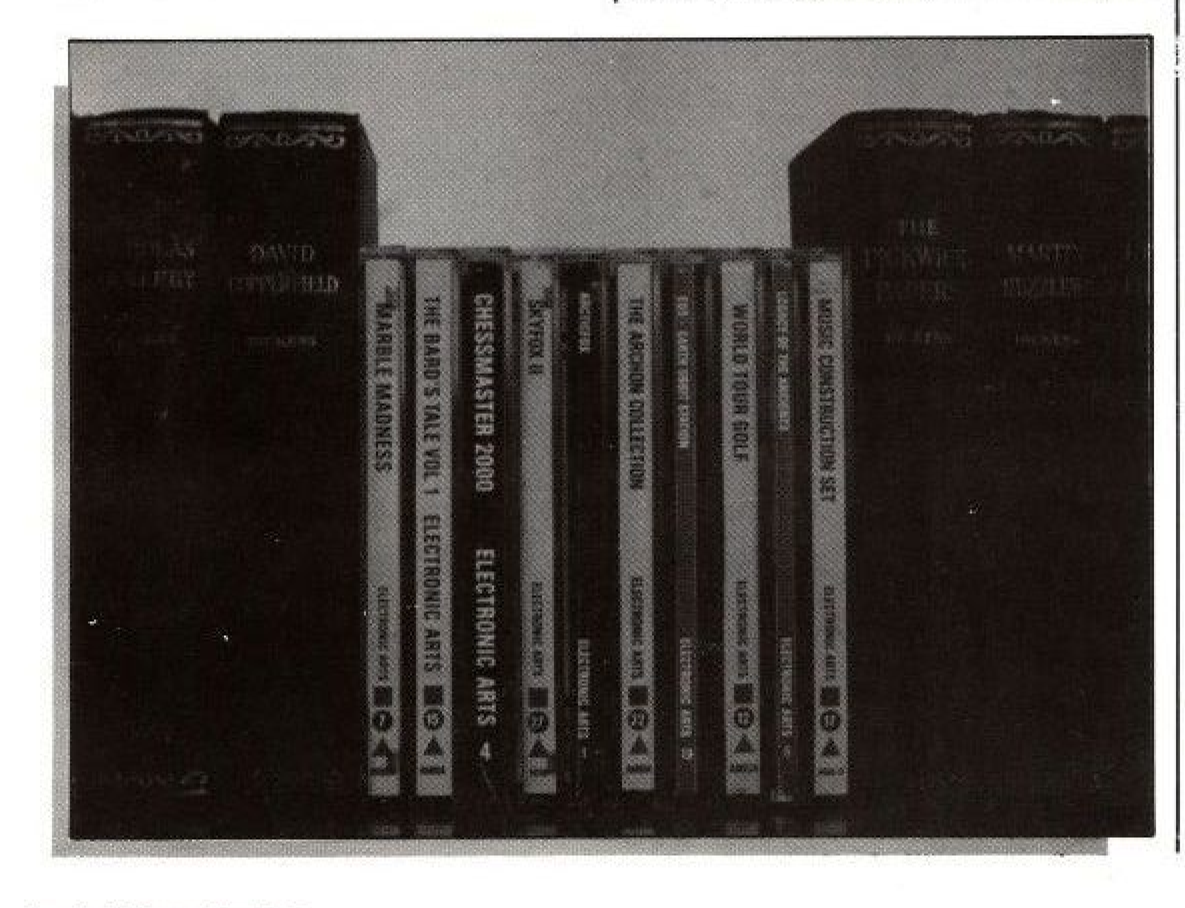
ROM TECHNICAL

VSE Technical Services has announced a package which will allow owners of a CPC 464 with DD11 disc drive to upgrade safely to CPC 6128 format. Previous problems with such an upgrade have usually been when the owners have tried to fit the ROM to the CPC printed circuit board, thus damaging it. Tim Morris of VSE states: "The ROM is soldered directly to the board in all but the early 464s and since a double-sided board is involved, removing the old ROM requires special techniques. There is a real danger of ruining your computer if you try to do the swap yourself."

Subsequently, VSE has offered a professional ROM installation service as part of its upgrade package. It includes a dK'Tronics 64K memory pack, the 6128 ROM and a CP/M Plus system disc, all at £84.70. The machine will then run all current CPC software.

All the components are available separately – £16.90 for the ROM, £43.90 for the memory pack and £18.90 for the CP/M plus disc. ROM installation costs £8.

It is also possible to upgrade the CPC 664 but owners will require an extension cable for the memory pack, which will cost an additional £7. You can contact VSE on 01-737 0234 or, alternatively, write to Unit 6, 8 Nursery Road, London SW9 6NB for more details.



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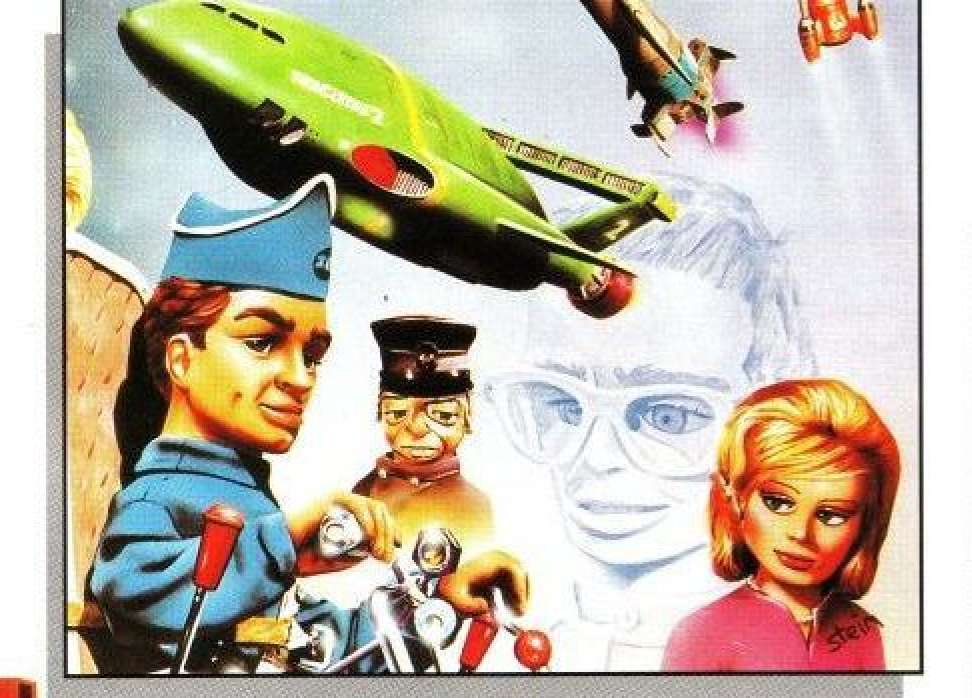
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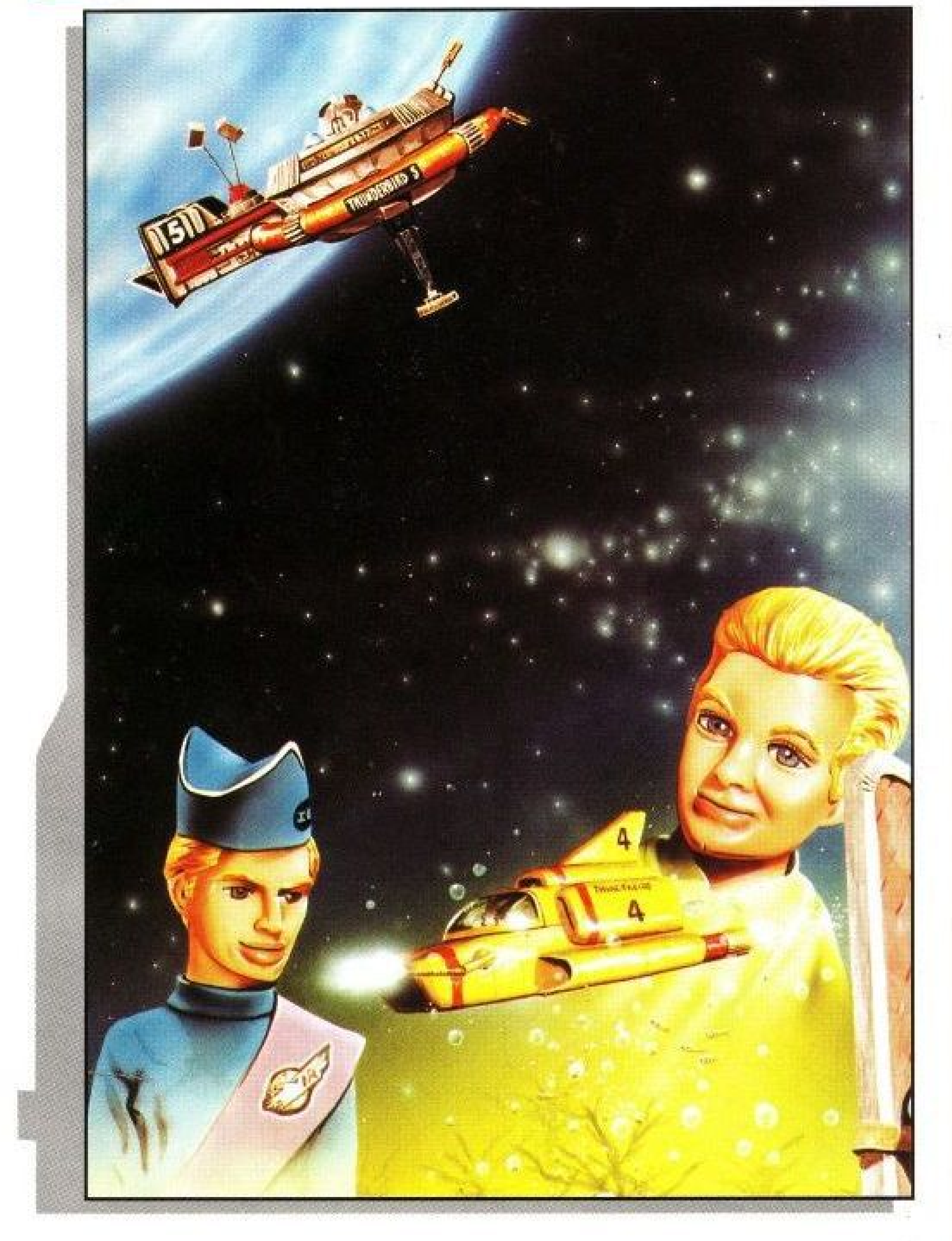
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Long before the event of realistic special effects, puppets ruled the screen. One such group stood out from among the many wooden heros, *The Thunderbirds*.

Grandslam is working on the computer game and to celebrate this momentous fact is giving away videos and T-shirts to the first five correct entries out of the bag. All you have to do is answer the three simple questions and send your entries.

1. In what kind of car does Lady Penelope ride and who drives it?

2. Which arcade character has just received the 3D treatment from Grandslam?

3. What is so special about Thunderbird 2?

THIS keyboard IS NOT PROGRAMMED
FOR THIS KEY HOLE





Top Right The winner, Steven Calf
Top Left Special publication for a very brave entry, Guy Prescott who is handicapped.
Bottom Left Runner-up publication for Mark Millar.
Well done and many thanks to all the entries. Continue to send in cartoons about ACU even though the competition is over, the best will always be published.



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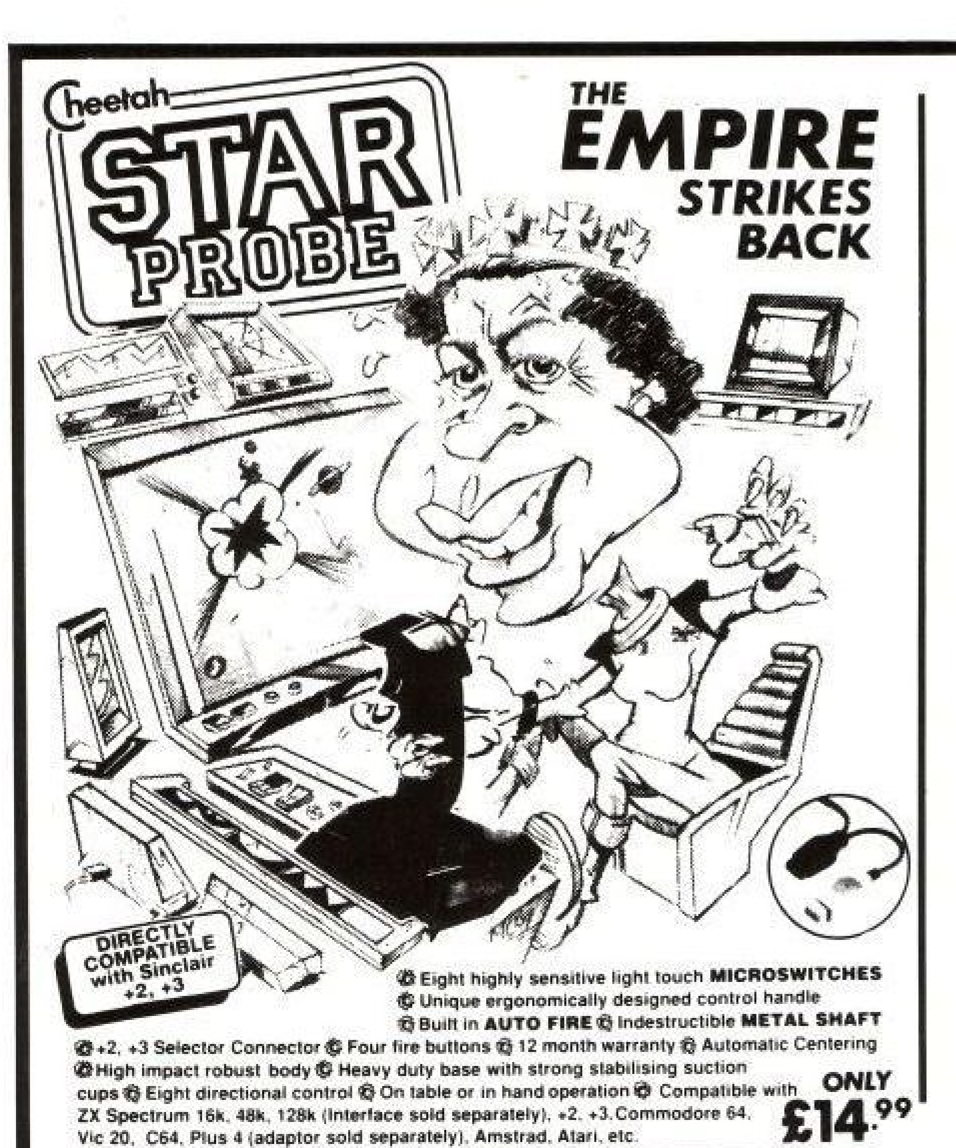
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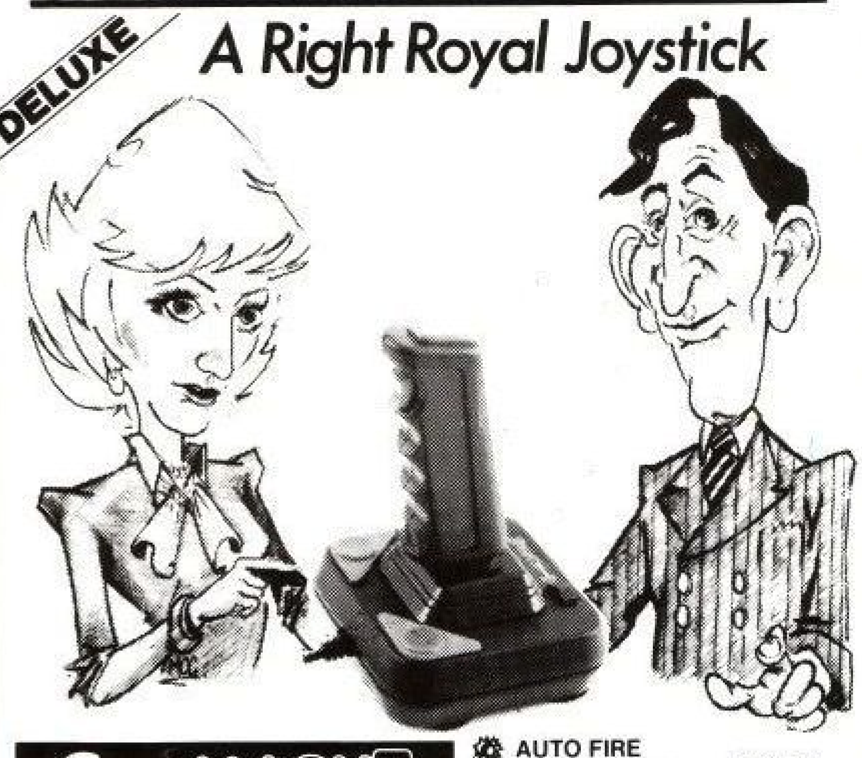
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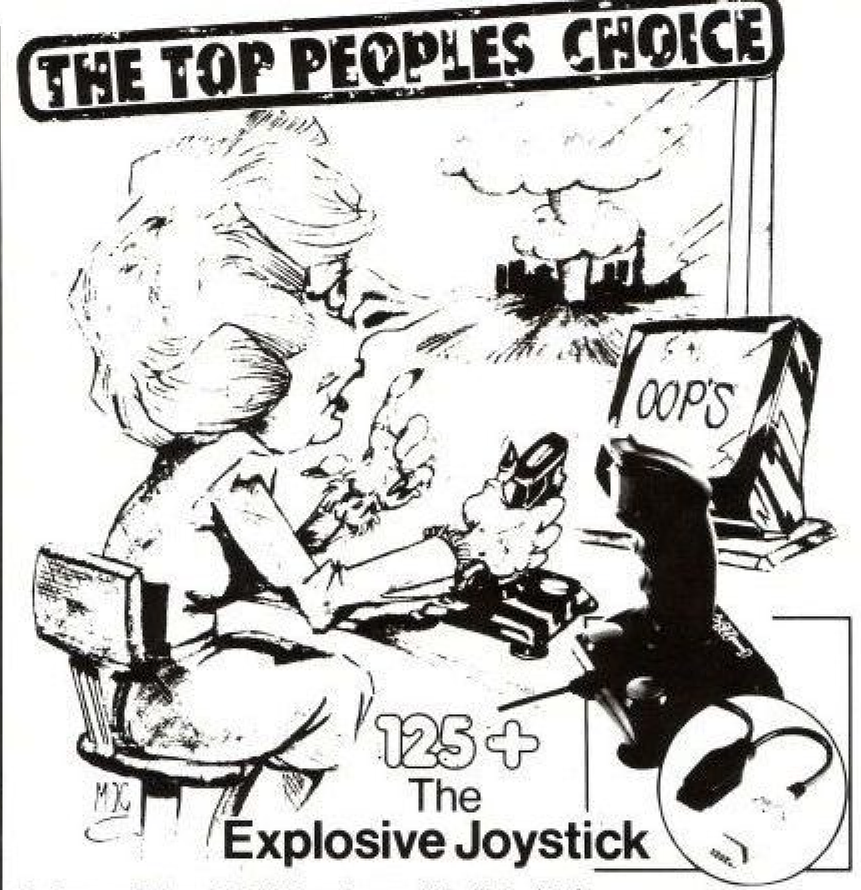
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John 'Pinball Maniac' Cook loads up for another foray into neon madness

Prepare to enter the Combat Zone

Here we go again, back in the depths of the Combat Zone, where alien life is cheap, extra lives are expensive and a *Power Drift* machine will cost almost £9,500.

If you want to play Power Drift in the comfort of your home, start getting friendly with the bank manager now or apply to take that City & Guilds Safecracking course.

Perhaps that explains why, if you want to play it in the heart of the West End, say at the showpiece Family Leisure in Old Compton Street, it will cost you £1 per go.

If you want to be good at a game, you have to play it a good deal. If you are playing in central London that means spending plenty of cash and travelling by Securicor.

In the centre of London, many of the newest machines from the big games companies are tested before going on general distribution. Power Drift is one of the best, together with the Electrocoin arcade in Tottenham Court Road, north of Goodge Street underground station. Both are essential places to visit for



Looks as if he is on the F-Plan diet.

any arcade fan, so long as they qualify as old enough to enter them.

Different rules seem to apply to seaside-based arcades, however, and it is cheaper, too. In Brighton, Power Drift can be played for 30 pence a go or two plays for 50 pence. There is better value from playing pinball – only 10 pence per go in some arcades. Compare that to up to 50 pence in London.

We are still talking about a three-ball game on the pintable. Gone are the heady days of the five-ball game, which is something of an annoyance to pinball fans everywhere.

If you go back to the 1930s and 1940s in the U.S.A., you find that many pinball tables were burned because pinball was deemed to be a game of pure chance. You have to remember that Americans are particular about gambling; there are only two states where it is legal.

In a test case, however, it was decided that pinball was a game of skill – moderated by chance. That is true. I shall always remember the World Pinball Champion going on live TV, putting a ball into play – and it going plumb down the middle like a whippet down a rabbit hole.

That is one of the things which makes pinball so interesting but it stands to reason that the fewer balls in the game the more important the random factor becomes.

My favourite game of the moment is *Taxi*, a Williams table which has been around for about a year. There are plenty of skill shots with the theme of the table being that you are a cab, picking up famous passengers when they hail you. The hailing is heralded by some digitised voice and a lane or set of targets starts flashing.

Passengers are Gorby, Dracula, Pinbot, Marilyn Monroe and Santa. Making all of them at the proper time gives you an easy shot for a jackpot of around £1 million. Designed by the guys who put together Pinbot and Cyclone it is very playable and the sound effects add touches which make it superb. Definitely one for the bedroom – assuming you have a spare £800.

Visitors to the ATEI, the major trade show in the U.K. for the arcade industry, saw a game in development shown by Sega. Called *Last Survivor*, it was a huge four-monitor/four-player unit. Now it has been completed and it will be big.

It is a maze game. You play one of seven players trapped in a maze and you have a gun. All you have to do to win is get four keys to the exit and get to it alive. You get hold of keys only by blowing away other players; each has a single key. There will be other human players, or CPU-controlled players, who will be stalking you just as you are stalking them.

Last Survivor would be interesting, even if it was a top-down *Gauntlet*-style view of things. The shock, horror, wobbly, how-the-hell-are-they-doing fact about the game is that it is a first-person view, with the screen made up completely of sprites. As well as going backwards and forwards you can rotate left and right.

Think of almost a whole screen made of sprites with virtually no background. So when you move, say, forward, every sprite on the screen has to be updated and/or expanded. Rotate and all the sprites have to be shifted. To make the game playable all this has to be done very fast.

If you have any programming experience you will realise that is tricky. Last Survivor manages to do all these things astonishingly fast. The effect is stunning, completely unlike any other game on the market.

Controls are simple; you have a joystick to move left/right,

If you go down the streets today.



One way to beat the tube strike.

backwards/forwards along a corridor. The knob on the joystick can rotate left/right to rotate your view left/right. All you need apart from this is a fire button.

To jazz the whole thing further the mazes are also inhabited by monsters of various kinds. These are all well-drawn and animated. Blow them away and you get money you can exchange for extra weapons at shop points.

Go in and a wizard offers you a selection of guns; Super Shot (fast), Power Shot (extra damage) and Wide Shot. Alternatively you can buy different types of armour which will give you a degree of protection from enemy fire, Magic Boots which will move you faster and finally, Meat which will restore your energy – shown at the top of the screen as a power meter.

What is difficult to describe is the feeling of the game – that you are walking through a maze – that there are loads of people out to get you and the way to jump out of your skin when a bullet whistles past your shoulder – from behind.

Fast and fun with superb graphic characterisation of the player sprites. Then there is the strategic element when you hang around the exit waiting for the bearer of four keys to arrive. Or do you hunt for them? Last Survivor will be a popular game in the arcades this summer but how can they convert it for the CPC?

They have been busy at Sega recently. As well as producing blockbusters like Last Survivor and



Change your skin lotion, mate.

Power Drift there is a thing called *System 24.*

When an arcade operator wants to change a game running in a particular cabinet he removes the whole circuit board and replaces it with another. That is expensive on the silicon, as you might expect, as a new PCB will cost around £700. It is the equivalent of buying a new computer every time you want to play a new game.

What Sega has done with System 24 is to create a generic PCB and produce new games on discs. Like you buying games, when a game on System 24 is getting a little old and producing less money all the operator has to do is buy new game discs plus a security dongle. There you are – new game.

Two games have hit this system so far, *Scramble Spirits* and *Gain Ground*. Although both were technically competent, neither would set the world on fire. A third has now been released, *Crack Down*, and it is much better.

An evil scientist, complete with hunchback and beard, has created artificial life and intends to take over

They have been busy at Sega recently. As well as producing blockbusters like Last Survivor and Power Drift there is a thing called System 24.

the world. It is not surprising that this is not popular, so you – or you plus a buddy – are sent to infiltrate his fortress and blow it up. Or Crack it Down.

The screen is split into three sections. The top piece works as a kind of animated radar, showing you the whole of the level. Then the lower two-thirds is split into two halves, showing a Gauntlet-style, top-down view of the area immediately round your character. When you play two-player – and it is best played that way – the two screens scroll independently of each other.

Apart from having to blow away the indigenous, hostile, artificial life forms with various hardware – pick up extra ammunition as you go along – you place time bombs on areas marked by red crosses on the radar.

The trouble is that the bombs are primed before you start the level and are counting down all the time you are playing. Take too much time over the placement of the bombs and the game is over. Best played as a team,



Need a new razor?

Crack Down is a lightweight game of medium difficulty, with some well-drawn graphics and some reasonable sound. Play it and you will soon be getting your money's worth.

Prehistoric Isle is what I call a game. Just when you thought that horizontal scrollers were getting boring, SNK produces a graphically-stunning, supremely-playable job with humour for good measure.

First it is the graphics which get you. Brightly-coloured, chunky, they attract you towards the scene. Start flying your biplane over the spooky Greenhall Isle, deep within the Bermuda Triangle; can you imagine how playable it is – responsive, loads of power-ups? Then you start laughing as the neandetals jump up and try to grab the aircraft. Then, when you reach the end of the level, you jump out of your skin as the brontousaurus moves faster than you can almost see and munches away at what used to be your wing.

SNK might not be the biggest game company but Prehistoric Isle is a gem of a game and it is one you will be tempted to wheel out of the arcade when eventually you are dragged from the machine by your misguided loved ones.

Have you ever seen any of those *Friday the 13th* movies? Or perhaps you minors played the Domark game of the same name? Then you will remember the character Jason, the nutter with the ice hockey mask and a rather unsavoury habit of treating young American teenagers like sides of beef. Well, with *Splatterhouse* it looks as if Jason has finally made it to the video screen.

You do not go around cutting/bashing up people – just ghouls, ghosties, piranha – like maggots and rotting corpses.

The controls are straightforward combat-game controls, punching and kicking left/right, but you can pick up items like meat cleavers and baseball bats to do the damage if you prefer.

The levels are a mixture of right/left scroll and static screen where spooky things happen. In the second level is a room full of pink maggots which dive at you with fangs agape. You kick them to pieces and think it is all over when one bursts out of a corpse hanging on the wall.

MICRO – SCOPE
Life in the lab



This month our eminant researcher Trevor Cummings examines the disc drives. Although old hat to some boffins, there are countless your readers who will doubtless benefit from his wisdom.

Welcome to the Micro-Scope. In this new column each month we will be putting all kinds of technical ideas and products under scrutiny. We will look at well-known hardware devices, such as disc drives and RS232s, and the not so well-known, like the switch which makes drive B: think it is drive A: As well as seeing each device in isolation, we will also see how it compares to other options.

If a new 5.25in. disc drive reaches the market, for instance, we will review it as it stands, compare it to other 5.25in. drives, state the cases and uses for 5.25in., 3.5in. and 3in. drives and also consider other relevant devices.

By presenting you with all the options in that way, the Micro-Scope review, or overall view as I prefer to think of it, will give you a one-look access to the state of affairs for each product type.

In addition, Micro-Scope will be sprinkled liberally with useful hardware projects, both large and small, which you can make at home, similar to our recent Romboard and Romchanger units; and, from time to time, we will look at some interesting parts of the CPC – how its in/out map works, why only two disc drives are allowed and the infamous 7-bit printer port are some of the topics we will cover.

We hope to interest and entertain you with the more technical side of computing and to keep you well-informed regarding peripherals. If there are any subjects you would like to be covered, write and tell us.

In this month's topic some of the information will already be known but remember that these computers continue to sell well and new users also need to be informed. Normally the CPC can accommodate two disc drives which are logically drives 0 and 1. On the 464 they are additions to the system, whereas the 664 and 6128 already have one built-in. The reason for only two drives is that, although the UPD765AC disc drive controller chip can produce drive-select signals for four drives, the CPC designers have not included the third and fourth drive signals in the hardware.

Pins exist for them on the drive connector but they are not wired to the controller. It is a pity, as a number of users are now buying third drives. Opening the computer and making the connections will not work as the firmware is also not designed to access more than two drives. One solution is the subject of this month's mini project.

Because the 464 has no means of



communicating with a disc drive it is essential that the first drive added is the DDI-1, which is identical to the FD1 second drive except that it includes the controller interface and ROM software needed to run it. It also includes a CP/M 2.2 system disc and connector for the second drive. Having fitted the DDI-1 to the 464, the rest applies equally to all CPCs. References to the 34-way connector also apply but, since it does not exist on the 464, it can be regarded as the 34-way ribbon cable.

Choosing a second drive is not so straightforward now as it used to be. In the old days it was simple. We were offered another Amstrad 3in. or nothing but since then retailers have made us aware that alternatives exist and that they might be beneficial.

The most commonly-used disc sizes today are the 3in., the 3.5in. and the 5.25in. Of them the 5.25in. disc has been the industry standard, although the 3.5in. is rapidly taking over because of the relatively low cost of discs – about £1 – and, like the 3in., it has a rigid plastic protective sleeve, and are open to dust through the head access window.

Even so, they can be bought for as little as 30 to 50 pence each. All three sizes of drives are available in both 40- and 80-track versions. The 40-track allows about 200K of storage on each side of the disc – 400K altogether – and 800K can be stored on an 80-track drive. Disc drives can also be single- or double-sided. They either have one read/write head which accesses one side of the disc or they have two, one for each side. Double-sided varieties can usually be operated as two separate sides with a directory for each or as one disc where both sides are used but, to the user, it looks like one very big disc, with one directory. The standard Amstrad CPC drives are 3in., 40-track, single-sided devices but the discs can be turned over so that both sides are used.

Fortunately we are not limited by size, number of tracks or number of sides for a second drive and several alternatives are aimed specifically at us. Pace and KDS do 5.25in., 80-track, double-sided drives and 3.5in., 80-track, double-sided types are sold by Siren Software and Microstyle.

All four drives can be operated as two-sided or as one disc. Nobody offers us an 80-track 3in. type but why should they? The 3in. disc is the costliest and the benefit of alternatives is to reduce the cost of discs. Incidentally there are some bigger-capacity drives which can store up to 3 or 4 MB but they need a different controller to operate them and are no use to us.

To use a disc drive requires a special program called a Disc Operating System – or DOS. In this area the industry has made some attempt at standardising, so that discs written one make of computer can be used by others. Running programs written by different machines, though, needs more compatibility than just DOS. MS-DOS, as used by IBM PCs and compatibles, and CP/M are the two most widely-used systems.

We are fortunate in being provided with two DOSs, CP/M and our own Amsdos, both of which expect to find only 40-track, single-sided drives on the CPC. To use a different one we need a different DOS and three are available – Rodos and Romdos, both on ROM, and Ramdos, which is the drive version of Romdos. They were reviewed in detail in the June issue. Both can operate any of the drive varieties mentioned but only Romdos and Ramdos can do it in CP/M



Hardware for July's Project

Second-hand drives can be very cheap and many people either use them or wonder if they can use them on the CPC. Some of them are satisfactory to use but others are not. The standard Shugart interface signals are implemented on our 34-way connector and most drives are made to accept them but some of them do not implement the Ready signal on pin 34 – pin 1 on the CPC.

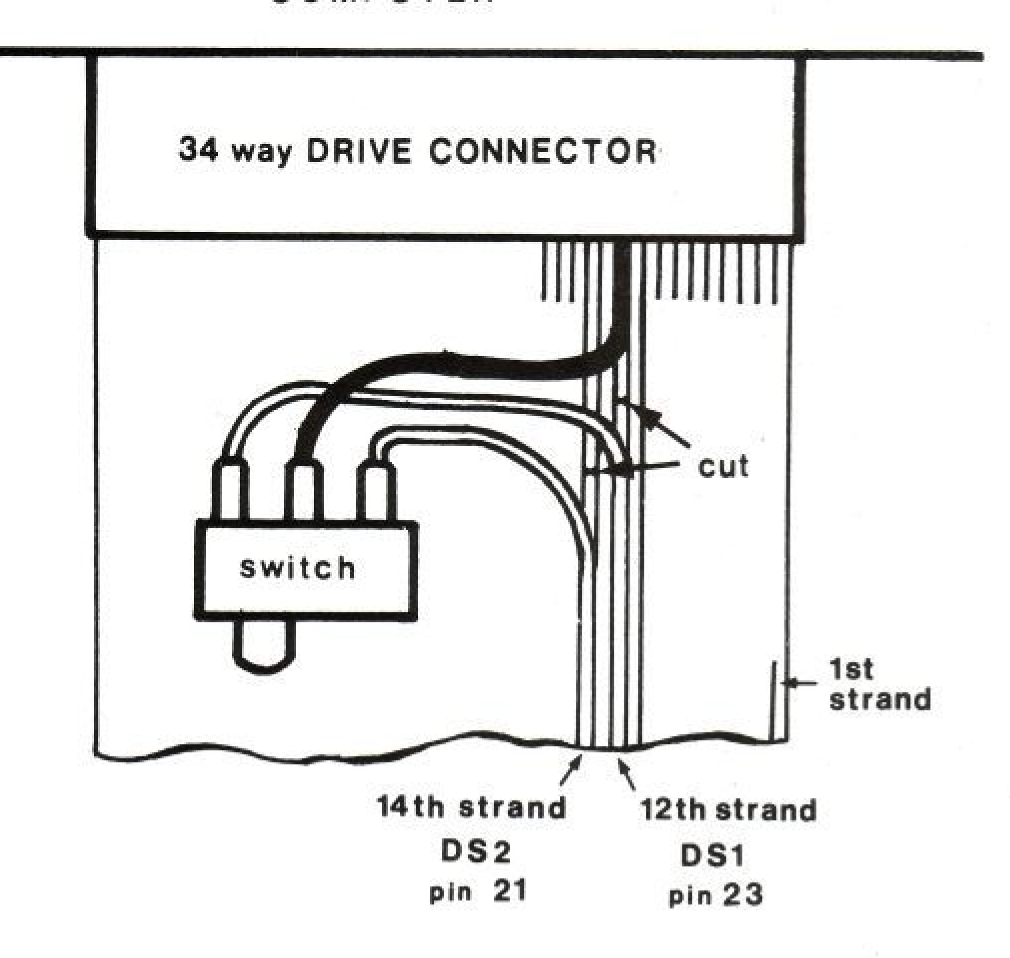
The drive outputs this signal to tell the computer it is ready; the CPC looks for it and without it we cannot access the disc. So there are two things to look for when buying second-hand – the Shugart interface and a track running from pin 34 and going somewhere. Other things to note are whether or not it has its own power supply and casing.

Disc drives usually need both 12V and 5V supplies but Amstrad suggests not using the monitor for this as it would place too big a drain on it, with possible damage resulting. Even the DDI-1 and FD1 have their built-in power supplies. Buying one could add another £15 to the cost of the drive and, although drives can be used uncased on a flat surface, buying a case could cost even more.

To help us manipulate the drives to our requirements two small products have appeared on the market recently. Normally the first drive is drive A: and the second drive B:. Sometimes it is desirable to reverse them. Saving many Multiface II-captured games on an 800K disc is one example, since M/FII recognises only drive A: and its saving method uses a good deal of disc space.

The 6128 Bootselector which also works on the 664 but not the 464 from Strathclyde Developments provides a switch at the rear of the machine to do that. Its cable has to be fitted on the inside of the machine – without solder – and detailed instructions are provided.

The other product is the Microstyle Drive Switching Cable which allows the addition of a third drive. The main reason, I suppose, is to have two standard 3in. drives for



normal use and a 3.5in. or 5.25in. for cheap back-ups. The cable plugs straight on to the 34-way edge connector, or the second drive connector on the 464, and a switch, mounted on the cable, selects either of the two attached drives as the B: drive.

In other words there are two B: drives, only one of which is operational at any time according to the switch position – like this month's mini project. How is that for a link?

This must be the smallest project ever to appear in a computer magazine. It allows you to connect a second B: drive, making three drives in all, and switch between them at will. The method is simple. Pin 23 of the 34-way edge connector carries the Drive Select 1 signal which is taken low when the B:, or 1, drive is accessed. All we do is intercept this line by cutting it in the cable and taking it to the centre of a double toggle switch.

One side of the switch has the drive side of DS1 connected to it and the other is connected to the DS2 line, which is pin 21. The switch can be mounted on the cable next to the computer or interface for easy access. On the circuit boards of most drives are a set of four drive select links marked 0,1,2,3 or DS0, DS1, DS2, DS3 or A,B,C,d – or even DS1, DS2, DS3, DS4 – and they are not necessarily side by side.

One of them will be linked by a jumper. On the second B: drive you must place the jumper on the third link in the series. The normal B: drive will have it on the second. In this way the CPC DS1 signal will arrive at the first B: drive on the DS1 line and at the second B: drive on the DS2 line but only at the drive which is selected by the switch.

The Siren 3.5in. has a four-position slide switch in place of the links. It can be seen inside the back after removing the cover and should be slid to the third position.

To attach the third drive, a 34-way connector must be squeezed on to the existing cable with a vice. The type of connector depends on the drive being used but it will be either an edge or a pin connector. The side of the cable on which cable is left between the drives can be turned over. If it is connected mistakenly upside down and turned on the motor well not stop after 10 seconds, as it should, but no harm will be done. Turn off and turn it over. That is all there is to it.

Next month we will examine that 7-bit printer port, why it exists and what difference it makes. We will see what prevents the eighth bit from getting through. We will check for unknown graphics characters lurking in our printers which the eighth bit would release. Changing printer routines will not work and we will see why. We will be building an 8-bit printer port which can reach the characters other printer ports cannot reach.

PARTS

All parts are available from Maplin Electronics, PO Box 3, Rayleigh, Essex SS6 2BR, under the following part numbers:

Item	Part No.	Price
34-way edge connector	FS80B	£1.25
34-way IDC (pin) connector	FG86T	£1.40
SPST Switch	FV01B	38 pence

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Siren Software	3.5in. drive	Various	061 228 1831
Microstyle	3.5in. drive	£89.95	0274 636652
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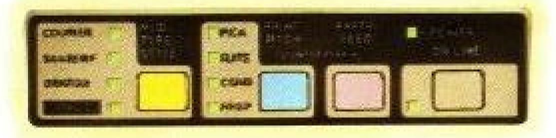
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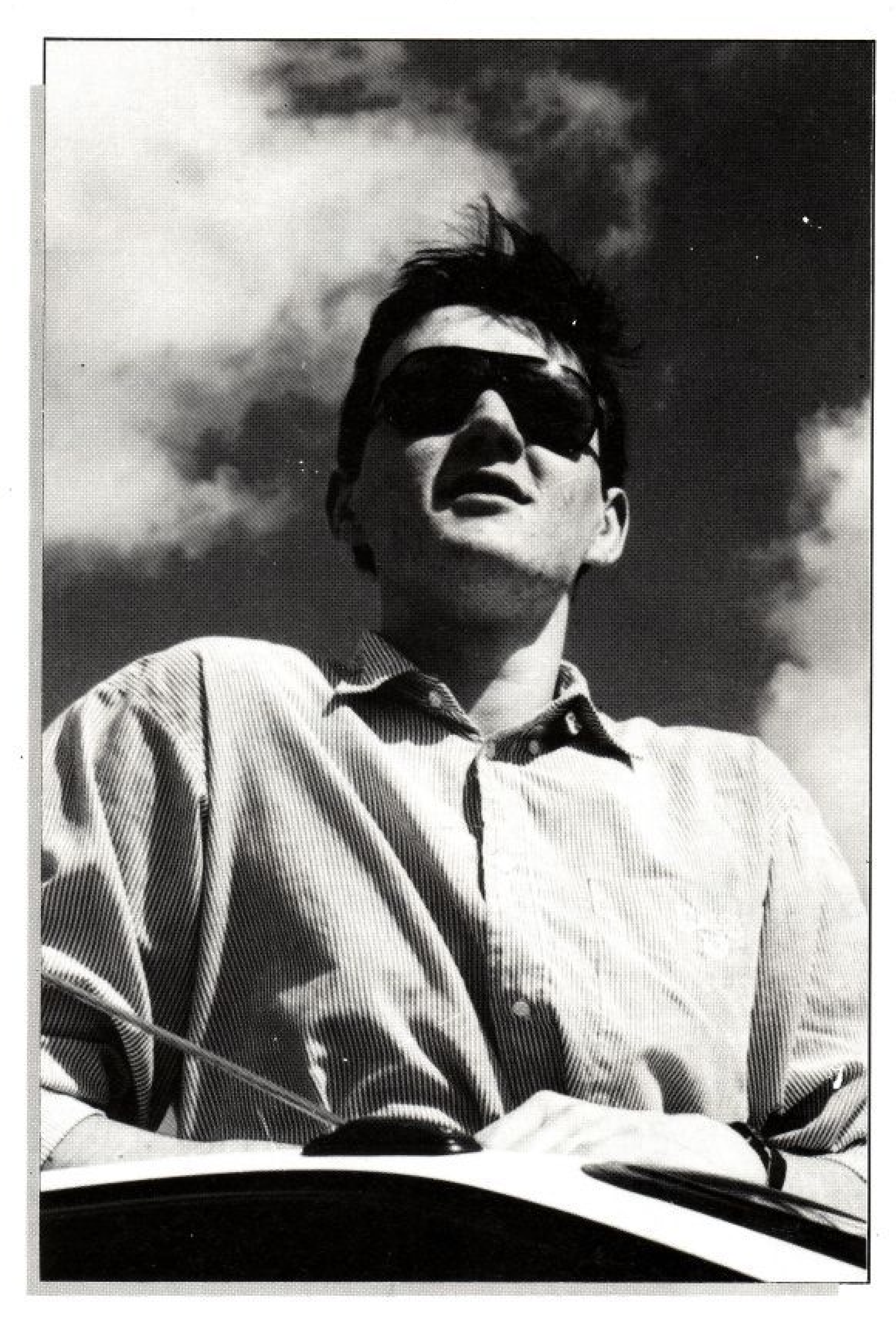
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Is this man on top of the world?

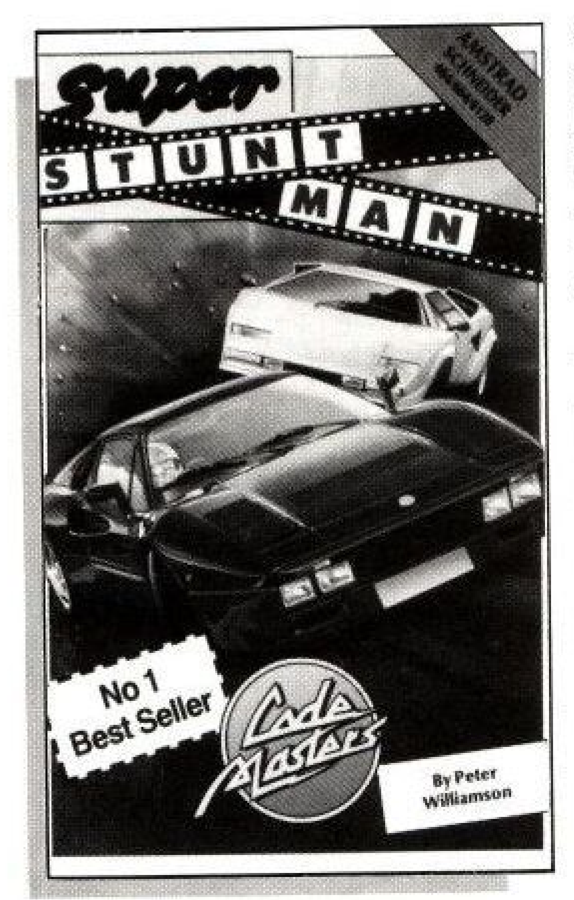
Who is this masked man? None other than once Amstrad programmer Peter Williamson. Forced to spill the beans, and everything else, as ACU drags him across the hot coals.



Code Masters is riding top of the Gallup chart. This is due mainly to a constant stream of quality releases, most of which are on the Spectrum and Amstrad. Behind those games is a team of dedicated programmers and we decided to look a little closer to see what little programmers are made of.

Peter Williamson works on a freelance basis for Code Masters and is responsible, or partially responsible in some cases, for such Amstrad hits as *Soccer Simulator, Stuntman, Super Stuntman, BMX Freestyle, Street Gang Football* and, most recently, *Motorcross Simulator*. How did it all begin for him? As with many of us his career started with a Christmas present – a Spectrum. Having showed some promise as a programmer, a teacher who was an old friend of the then software manager at Database Software managed to get him involved in the programming of *Mini Office* on the Amstrad and Spectrum and *Mini Office II* on the Amstrad.

He says: "It was just luck really;" although I am inclined to believe more in the hard work and talent theory. Williamson then decided it was time to move into the entertainment side of the industry. He produced two games for Players, one of which he would rather forget,



before moving to be a freelance programmer for Code Masters.

Working initially from home, he started with the Spectrum conversion of *G-Man* and from there to developing the aforementioned titles. Last September he became a permanent fixture at Code Masters. Although still freelance, he now rates a Portacabin. His fervent wish is for a telephone extension so that he does not have to walk to the main building every time someone calls him. He prefers that arrangement, despite the lack of a telephone, as it permits greater communication with the powers that be, thus enabling a better product to be produced.

Although Williamson writes games for the Spectrum and Amstrad he does all his programming on a PC. That allows him to use more advanced programming tools and compile programs in memory, thus saving a good deal of time. A cross compiler is used to produce a compatible code for the two machines.

Williamson discusses his ideas for games with Code Masters and, if approved, he produces a detailed game design. He says that the advantage of working on-site is that any new ideas can easily be incorporated because the management can be consulted by walking to the main building.

When asked about full-priced titles rather than his previous budget game projects, he said that although he enjoyed working with the team which produced *4 Soccer Simulator* he would rather work on budget titles because they do not take too long to complete and he thought that 4 Soccer Simulator dragged a little.

He says the budget games are faster to program because "they are usually simpler games and much more cheerful." When asked how long, he replied: "Anything between two to three months."

Williamson has been with Code Masters for two years now and despite his freelance status he is more than happy to stay with the company. When asked why, he replied: "Code Masters pays well." In his work for Code Masters he has covered many subjects but he prefers the arcade-type games above all else. Although he finds the role of pogrammer lucrative he intends to move eventually into software management.

Originally from Dunfries, he is studying management and computer science at Edinburgh University. While at Code Masters he is taking a year off from his studies but if his one-man company, Super Sonic Software, continues to prove lucrative he may decide to take a more permanent break. Considering his tender age of 19, I think Williamson is doing rather well for himself and the Amstrad community.

Peter Williamson works on a freelance basis for Code Masters and is responsible, or partially responsible in some cases, for such Amstrad hits as BMX Freestyle, Street Gang Football and, Motorcross Simulator.





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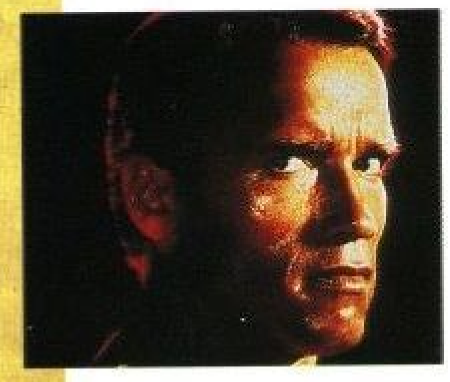
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Joystick jockeys rejoice. This month we have everything from the fiendishly addictive *Tetris* to the simulated racetrack antics of *The National*. For those who prefer more physical exertion we have *Street Gang Football* and *Motorcross Simulator.* Warm up those joysticks in anticipation and read on.

GAMEPLAN



THE RUNNING MAN

Arnie on the Arnold as a muscle-bound hero enters the world of the television quiz show.



TETRIS

The latest fiendish plot from the U.S.S.R. to enslave the minds of the young.



RUN THE GAUNTLET

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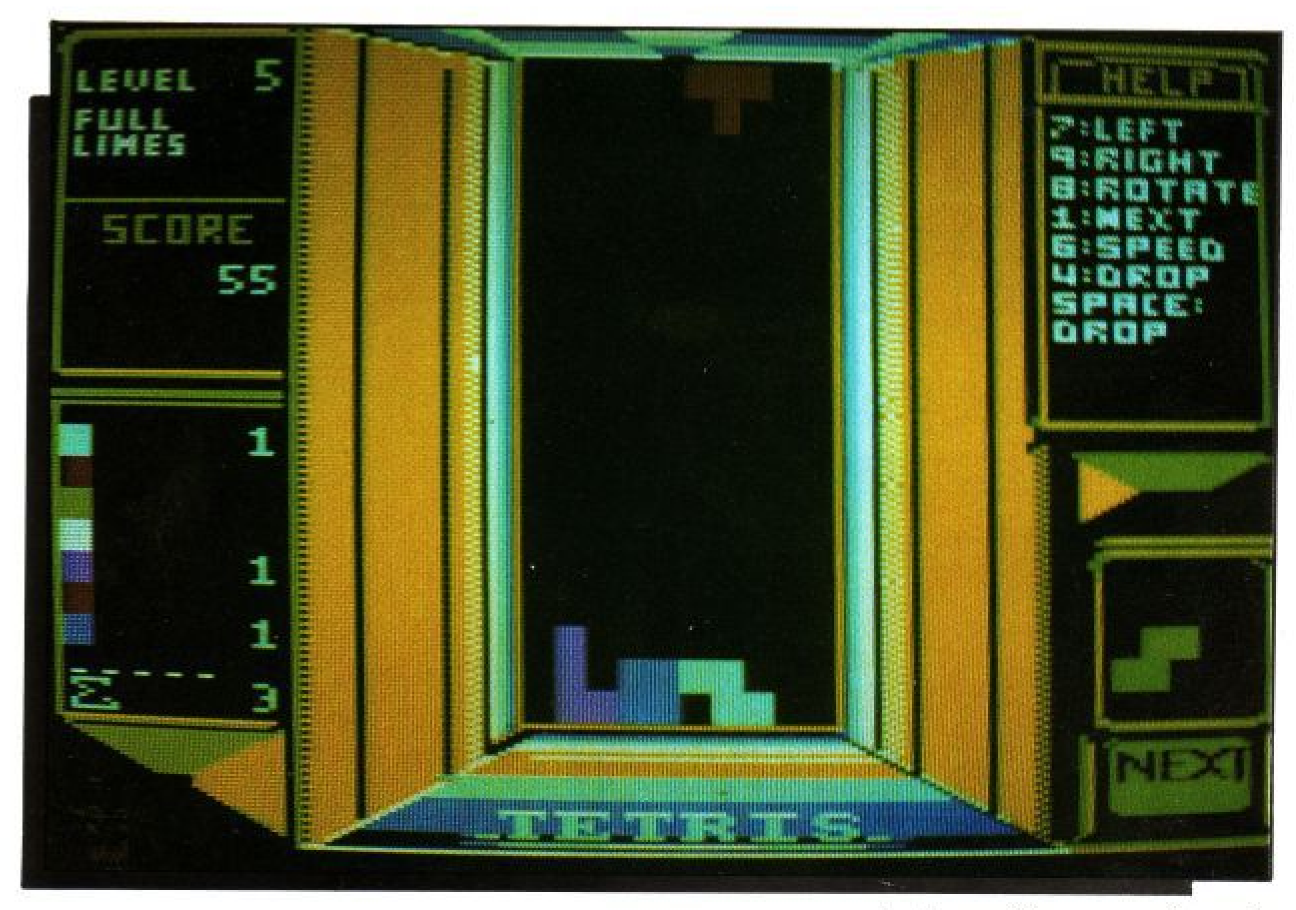
PLUS

The Hit Squad, Street Gang Football, The National, Barry McGuigan's Boxing, Motorcross Simulator, The Real Ghostbusters, Obliterator.

TOP 20

Pos	Last	Title	Publisher
1	(4)	Treasure Island Dizzy	Code Masters
2	(1)	Robocop	Ocean
3	(17)	Twin Turbo V8	Code Masters
4	(3)	Dragon Ninja	Ocean
5	(RE)	Yogi Bear	Alternative
6	(2)	SAS Combat	Code Masters
7	(NE)	Spy Hunter	Kixx
8	(15)	Operation Wolf	Ocean
9	(10)	Big Foot	Code Masters
10	(NE)	Gun Boat	Alternative
11	(20)	Thunder Blade	US Gold
12	(8)	World Games	Kixx
13	(13)	Who Dares Wins 2	Alternative
14	(RE)	Joe Blade 2	Players
15	(RE)	Street Gang	Players
16	(9)	WEC Le Mans	Imagine
17	(18)	Bomb Jack	Encore
18	(6)	Fun School 2	Database/Mandarin
19	(NE)	123	Firebird
20	(NE)	BMX Simulator 2	Code Masters

Last week's position in brackets
Top 20 compiled by Gallup



TETRIS

These blocks are made for building and they'll build all over you.



A question for you, comrade. What is Mother Russia's greatest contribution to Western culture? The furious folk dances of those freaked-out Cossacks? The heroic Revolution? The political musings of its great thinkers? Yuri Gagarin? The Moscow State Circus? No, it is a computer game, *Tetris*, and thanks to perestroika – with a little help from Virgin Mastertronic – it is available to capitalists in the decadent West.

The concept behind Tetris is simple and, like most simple ideas, it works. The comrade-player has to control the descent of various multi-coloured shapes from the top to the bottom of the screen. As the shapes reach the bottom of the screen they pile up, layer on layer.

The comrade-player can manoeuvre the falling shapes left or right and also rotate the shapes through multiples of 90 degrees with each squeeze of the firebutton. Once a shape has been guided into a desirable position at the bottom of the screen another will fall immediately. By slotting the falling shapes together skilfully a uniform – I like that word, comrade – and unbroken row can be created, which then falls off the screen. In that way the ever-increasing stack of shapes can be prevented reaching the top of the screen.

Of course this is no simple task for the shapes falling often have no discernible residence in the mass below, dissidents. This problem is compounded by the nasty habit of the program of dropping squares in batches of six or more, the square not being the easiest shape to house.

Points are awarded for every shape on-screen and for every row you clear. One mistake in placing the shapes can be disastrous and, as the screen begins to crowd, the shapes have less distance to fall, and consequently the frantic comrade-player has less time to decide how best to organise and position his shapes. It is, as we like to say to new conscripts, a Catch-22 situation.

A helpful item is in the box on the left-hand side of the screen which indicates in advance which type of shape will follow, which is useful for five-year planning. Tetris has nine levels of play and in level one the shapes fall slowly enough for the comrade-player to handle easily but on level nine even comrade Karpov would shout "Niet".

Only the Russians could have produced such an insidiously addictive game. I am certain the KGB uses Tetris to brainwash its victims, such is the mental anguish which accompanies each game. Heed this warning from your comrade leader – first among equals – this game is addictive. It may distract some from completing their work quotas. It certainly did at the State magazine for Amstrad owners. They could not refuse another game. You may end up queueing in the streets for a copy.

Simon Pipe

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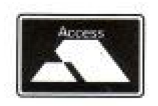
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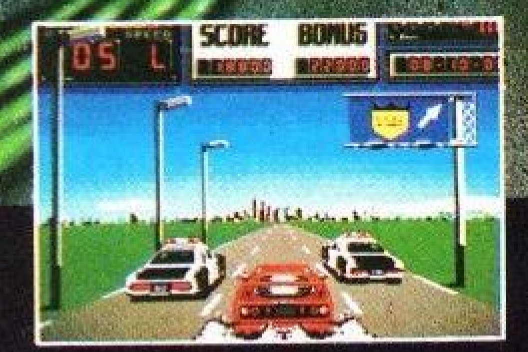




Crazy Cars II









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THE HIT SQUAD

Mass murder and mayhem as the Hit Squad take on Mr Big.

I shuffled casually through the derelict subway train, scattered glass underfoot, the foul smell of death hanging heavy in the air. Ahead the sound of a leg being dragged was accompanied by a desperate rattle of lungs too used to inhaling matter other than oxygen.

I cornered the filth five minutes later, sweat rolling down a scar-crossed face, slumped into a torn, soiled seat. I smelt fear in the air as I pulled out my Uzi and pressed the barrel against his forehead. A twitch of a finger later and what passed for brains decorated the sides of the carriage. Another lackey of crime baron Emilio Bocker wasted but there was still more than enough gun fodder to get before I got to the big boss himself.

The latest Code Masters release casts you as an avenging streetfighter, out to rid the crumbling ruins of Los Angeles of Mr Big, Emilio Bocker. You are a lean, mean fighting machine, a one-person hit squad. In fact, you are four completely different people – sexy Xena, Robert Redford look-alike Ace, large tree trunk look-alike Stak and slender but deadly Zara. Talk about schizophrenia.

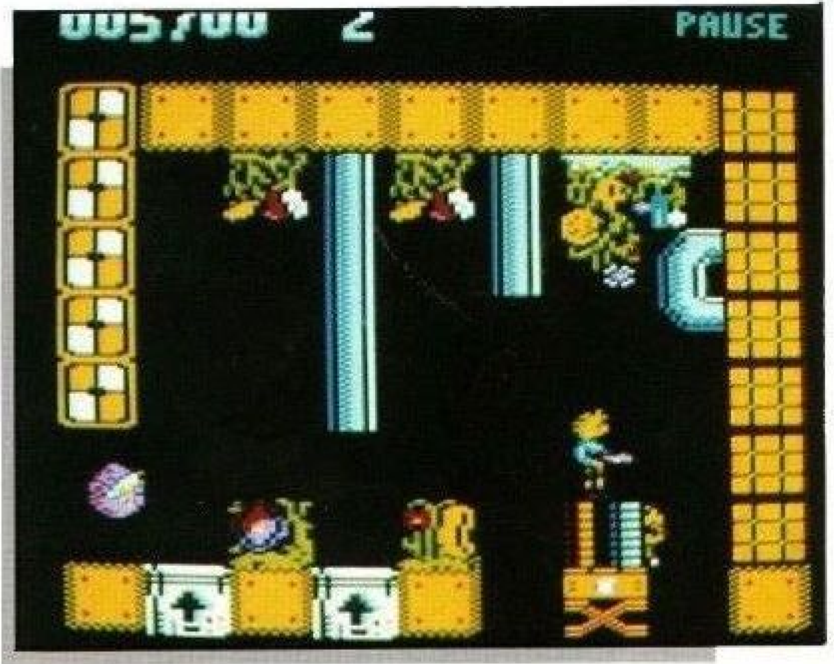


Each of the four characters has four potential weapons, which are activated automatically and sequentially on collection of a weapons icon. You could be handling a pop gun one minute and a flame thrower, burst gun or pulse sword the next. If you are really lucky you could equip yourself with super jet boots which give you the ability to leap tall buildings without having to wear tights.

The objective on each level, as you get closer and closer to encounter Mr. Big, is to collect a teleport token and make your way to the telephone box marked 'Teleport here – have your passports ready. Collecting the weapon icons endows you with progressively better weapons, which you will certainly need to advance all the way through the 12 levels of the city.

Extra life tokens, freezers and shields are the other things worth looking for, as well as the local Wimpy.

Make sure you eat any pieces of food lying around as they restore your energy level which depreciates at an alarming rate. It is a pity half of the bad guys can fly and that the other half do not look remotely humanoid.



The graphics are reasonably good, being multi-coloured for once, but you are treated to re-drawn screens rather than any manner of scrolling and, although this is a fun blast, it is scarcely state-of-the-art.

A fair measure of entertainment, enough playability and levels to keep you at it, so check *Hit Squad* and go gunning for someone who really deserves a bullet in the forehead.

Mark Ulyatt

ROUND-UP

NAME	The Hit Squad		
SUPPLIER	Code Masters	PRICE	£2.99
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

"I pulled out my Uzi and pressed the barrel against his forehead."



RUN THE GAUNTLET

One challenge you dare not miss.

I hate to start a review with a complaint but I came very close to throwing my CPC out of the window when the game once again presented me with "re-wind tape and press play." I hate multi-load tapes with a passion greater than my love for rum truffles.

Based on the TV series of the same name which terrified parents and thrilled the children, by placing them in charge of some serious horsepower. The computer selects the events randomly in which you are to compete. That is the cause of the multi-load aggravation but at the same time it offers a welcome breath of variety. Each leg of the game is split into three sections. After competing in all three sections you receive an overall score; finishing last means you fail to qualify for the next leg.

The events which comprise each leg fall into three categories – the hill, water and off-road courses. The hill is the most joystick-demanding event as you pound your way to victory. This event differs from the others as it takes place without the aid of a vehicle. Your man must wade through water and mud-filled pits, scale nets, balance on logs and generally avoid the myriad obstacles encountered. A good right arm is essential for this event.

The water events take place on a lake. Four types of vehicle are available for this stage – the highly-manoeuvrable jet skies, the agile speedboats, inflatables and the total mayhem of the hovercraft. Luckily, hitting one of the obstacles or course markers is not fatal. Doing so results only in a few seconds of rapid oscillation.

The land equivalent of the water races has an added dimension. Apart from tackling the dirt tracks you must contend with the undulating surface. At high speeds your vehicle launches into space, hopefully landing in time for the next corner. Rather than scroll from track section to section the screen flips from page to page. A map in the top corner of the screen appraises you of the total picture.

Avoiding the many explosions which detonate round you can be a problem at times. Fortunately, they merely throw your vehicle skywards and rotate you in a random direction. This section of the game would be the best, except for an unfortunate bug. When colliding with the computer-controlled vehicles you spin wildly, often off the track and on to another section at the other side of the course. Occasionally, but far too frequently, your vehicle will bounce off the track completely, finding itself in unexplored areas of your computer memory.

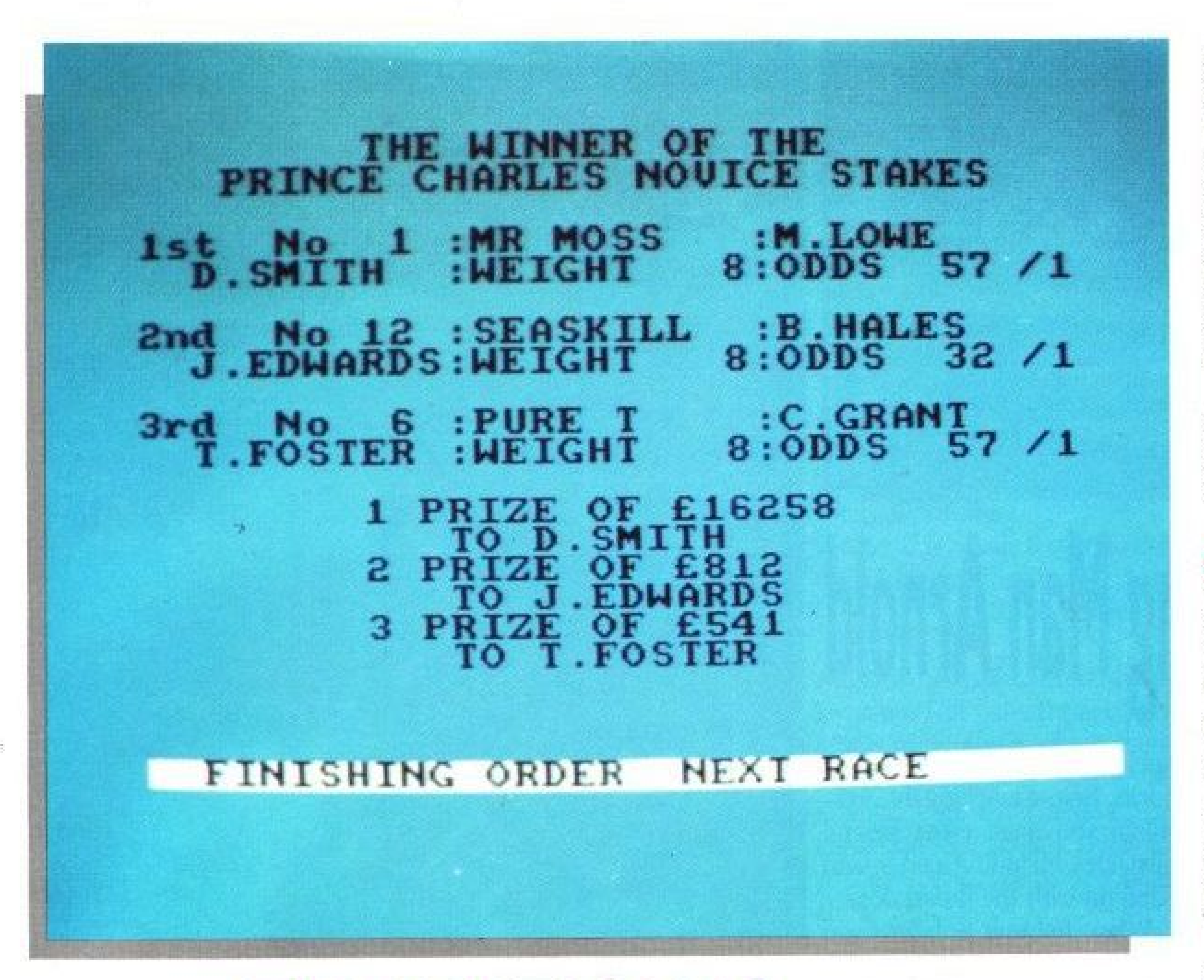
An enjoyable game despite the bug and the multi-load and not so easy as to be beaten at the first attempt – or the twentieth for that matter.

Adrian Pumphrey



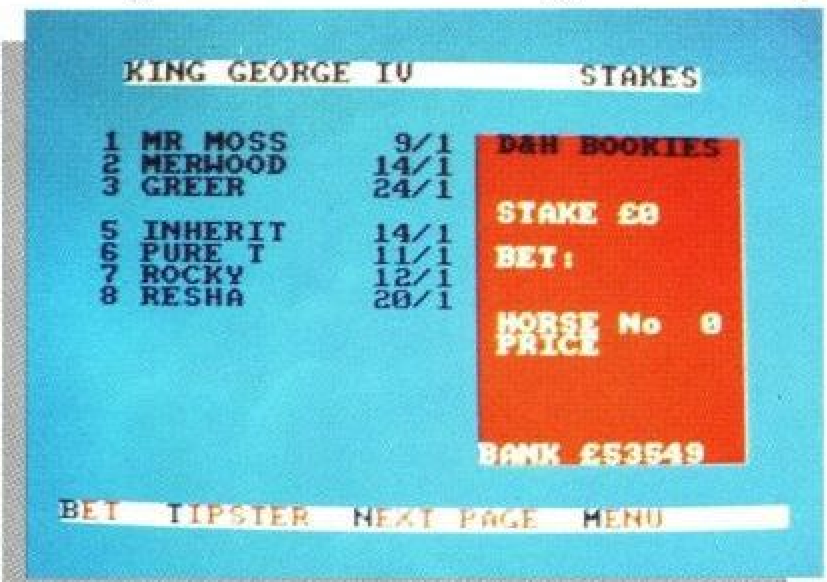
ROUND-UP			
NAME	Run The Gauntlet		
SUPPLIER	Ocean	PRICE	£9.95/£14.95
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

"The game which terrified the parents and thrilled the children."



THE NATIONAL

Gambling fever hits all-time high as you balance your stakes against your shares in the glue factory.



Strategical games have covered almost every aspect of life and sport but I have yet to see a true management game based on horse racing. What is this I spy? *The National*, a horse racing management game. Well, is that not the strangest of coincidences? The National is a thoroughbred game, from the same stable as *Football Director II*, one of my all-time favourites. The idea is a very old and obvious one but the implementation is spot on for addictiveness. As a great lover of both managerial games and racing of the equine kind, I could scarsely fail to be attracted to such a piece of software.

The aim is very simple; you must finish a season of racing, both flat and jumping, and hope to end on top of the trainers, league. That is far easier said than done. Many factors can prevent you doing so, not least the fact that all the other trainers are far better than you and seem to have an unlimited supply of money.

You start the season with a tiny stable of four horses, the minimum allowed, and none of them has the class to enter the major races, although they have the potential. Thus a quick stop at the horse auction is necessary, where it is possible to buy the next National winner. This is another problem, because you have a limited supply of cash and good horses cost money. Money can be gained in two ways, by betting on races or by winning races.

The races are not easy to win and some of them seem to be constantly beyond your grasp, even though you may have the best horse at the time. Jockeys also determine the overall winner and there is a jockey table available, so you can choose the best at that time, based on their form that season. Weight, age, class and current form are also contributory factors, so there is plenty of strategical thinking to be undertaken if you wish to win.

The presentation throughout is of a very professional standard, although sometimes the wait between keypresses and action can be slightly too long. The race could also have been improved, as it takes too long to produce the winner and there are no pretty graphics to distract you.

I liked the National. It certainly appealed to me and, as the only game available which deals with horse management, it seems a sure-fire winner for any who wish to dabble in that genre.

The National is available only by mail-order. The address to target cheques, postal orders or enquiries to is D & H Games, 19 Melne Road, Stevenage, Herts SG2 8LL.

Richard Henderson

ROUND-UP

NAME	The National		
SUPPLIER	D & H Games	PRICE	£9.99
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

The National is a thoroughbred game from the same stable as Football Director II.



Running Man Arnold

No-one paints a dark future like the master of horror Steven King, regardless of the name he is using at the time. The book inspired the film and from the film came the computer game. Urban decay and renegade heros come together in the gameshow of the future; you are *The Running Man*.

Who better to play the reluctant hero than Arnold Schwarzenegger, the man with only one facial expression – it is time to die. The character he plays is Ben Richards, an upstanding cop who has been branded a criminal because he refused to fire on an unarmed gathering. Being a practical totalitarian, state prisoners are compelled to entertain the public before they die. The mode of execution is a hit television show which goes by the name of The Running Man.

Being an ordinary kind of guy Richards is determined to survive and visit the host of the show, Damon Killian. On the way Richards will be able to tamper with the secret transmitter which lays within the kill zones.

The game starts with Richards vowing to return, followed by a quick chute ride to the first kill zone. There in the abandoned ice rink you will encounter SubZero, the brutal opponent equipped with a razor-sharp hockey stick and explosive pucks. Before reaching the arch-villain you must cross several obstacles, including a pit – and contend with the guard dogs.

When fighting SubZero you must avoid the pucks he sends sliding across the floor and the odd swipe he takes with his stick while attempting to deliver a fatal series of punches and kicks.

Death occurs when your energy bar is depleted. At that stage you are deemed to be unconscious and no longer capable of continuing the game. There are three ways to regain lost energy. One is to wait in a safe place – usually on top of an obstacle where the dogs cannot reach you – or to use the medical kits which can be found on later levels. The third method is to solve the puzzles which are encountered between levels.

The puzzle takes the form of two seats of icons arranged in circles. It is your task to rearrange the icons in the first circle so that they match the icons in the second. At any time two icons are highlighted. By pushing the joystick either to left or right results in the highlights moving to the next appropriate pair of icons. Pressing the fire button swaps the two highlighted icons.

Regardless of whether you complete the puzzle successfully or not you are off to the next level and a confrontation with Buzzsaw. As you run along the

deserted streets in this section you will find two weapons and a medical kit. Throwing the brick at your opponent is effective but it has to be retrieved afterwards. It is much better to bash your opponent with the lead pipe.

Once again you must beware of the dogs which tend to get in the way during a final encounter and this time you must also watch for the tri-Teflon-coated chainsaw of Buzzsaw. At least that will not be one of those sticky situations.

After the puzzle it is on to the once bright lights of Los Angeles and the electrifying Dynamo. This fiend throws bolts of electrical power which must either be ducked under or jumped over or you face the consequences. To fight Dynamo you are armed with a spiked club.

The fourth and final kill zone is occupied by Fireball. Getting to grips with this opponent is not so easy as it seems as his flamethrower also functions as a jet pack. When on the ground this opponent shoots fireballs at our hero but judicious use of the shield protects Richards from harm.

The final section of the game takes place in the television studio where it all began. Before you can get your hands round Killian's throat you must battle your way past more guards, both of the human and canine variety. Using your gun you must take out the guards while avoiding their return fire and fight your way to Killian and revenge.

Even the most hard-bitten combat freaks will enjoy this game as they encounter opponent after opponent, each with its own method of termination. The atmosphere is provided by a series of footsteps, rasping of chainsaws and the belch of flames, although you will probably be too busy avoiding the flak to appreciate those affects fully.

Adrian Pumphrey



ROUND-UP

NAME	The Running Man		
SUPPLIER	Grandslam	PRICE	£9.95/£14.95
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

"The brutal opponent equipped with razor-sharp hockey stick and explosive pucks."



BARRY McGUIGAN'S BOXING

Slug your way to the K.O. with good old Bazza.

I could have been a contender. Well, perhaps, if only I was not cursed with such a feeble body. Standing in front of a mirror observing my white unhealthy flesh, gripping a Charles Atlas advertisement in one hand, a Marc Almond record in the other, I knew I would never be another Rocky.

Then, one day, a review copy of *Barry McGuigan's Boxing* arrived. It was my chance to become a punch-drunk caveman in the safety and comfort of my home. I loaded it. I have always thought McGuigan was one of the few world-class boxers Britain has produced, despite his disastrous title fight in Texas. The loyal fans were chanting "Baa-ry! Baa-ry!" as he climbed into the ring. They were still chanting his name as he was stretchered out. Not so much a boxing match, more a mugging witnessed by 150 million people. Still, if the game has Bazza's name on it, all is well.

To begin you are presented with a picture of 'Joe Normal', a boxer which you alter to suit. I named my boxer 'Savage Simes' and gave him brown hair, white skin, red shorts and so forth. Also displayed were his statistics, which included strength, agility, endurance, best punch, recovery, stamina, image and attitude. Most are self-explanatory, except for the last two.

The image of your boxer relates to how the rest of the world views him and if he wins a number of fights in succession his image rating rises and so do his earnings. A boxer's attitude is gauged by what kind of fight he puts up in the ring. I began with a positive attitude but with an erratic image; no-one was sure of Savage Sime's fighting qualities. You can also choose which style of boxing most suits your man, ranging from a 'dancer', like Ali, to a 'brawler' like Tyson.

It is time to choose an opponent. Savage Simes was listed 19th in the world ranking table. I was able to select an opponent from three comparable pugilists rated 20th, 18th and 17th. You can view the statistics of a potential adversary before opting to fight him. This is very useful if your opponent is to be a psychotic wrecking machine built like a Greek restaurant, in which case it is wise to reject him and opt for an easier match.

I elected to fight Typhoon Thompson, ranked 18th. Before the fight, though, there was training camp. This is a chance to improve your statistics by training on weights for strength, roadwork for stamina, sparring for endurance, and light/heavy bags for agility. You are given a certain number of weeks in which to train, usually between four and 10, and must allocate each week to an activity. It is worth noting in which areas your opponent is weak and then exploiting it this by training in those areas.

Fight day arrives. The two boxers are viewed side-on and although the graphics are blocky and awkward, at least the two boxers are distinguishable. Joystick control allows the player to jab, throw a cross, execute body blows or cover up. The computer controls movement back and forth across the ring. Above the two protagonists is displayed their respective endurance levels. Once a boxer's endurance level falls below 10 points or so a tap on the wrist can knock him down.

Round one. Ding! Ding! Savage Simes danced towards Typhoon Thompson, landing jabs and crosses with consummate ease. It was like taking candy from a child. The more the two boxers mix it the louder the crowd roars become and the sound effects were very good for building excitement. At the end of the round, both boxers, statistics are shown, usually much reduced, and also who is ahead on points.

Needless to say, I dropped Typhoon Thompson in the third. The crowd mood indicator declared they were ecstatic. So was I – Savage Simes was unbeatable. He was a lean, mean fighting machine, a steamroller of destruction. Hold on a minute; with all this excitement, I have a nose bleed coming on.

My next 'victim' was Pretty Boy Synder, ranked 17th. A little training and 'Savage Simes' was oozing doom and destruction. Unfortunately, Synder had other ideas. He wore me down for three rounds. He floored Savage in the fourth.

"Get up, get up" I screamed at my struggling warrior. Savage beat the count, only to be brutally battered to the canvas again. "You're not hurt," I screamed. "Get up, whaddaya think I'm paying you for?" That did it. Savage staggered to his feet in the eighth second. Then he was decked again. Despite my ravings, he did not beat the count.

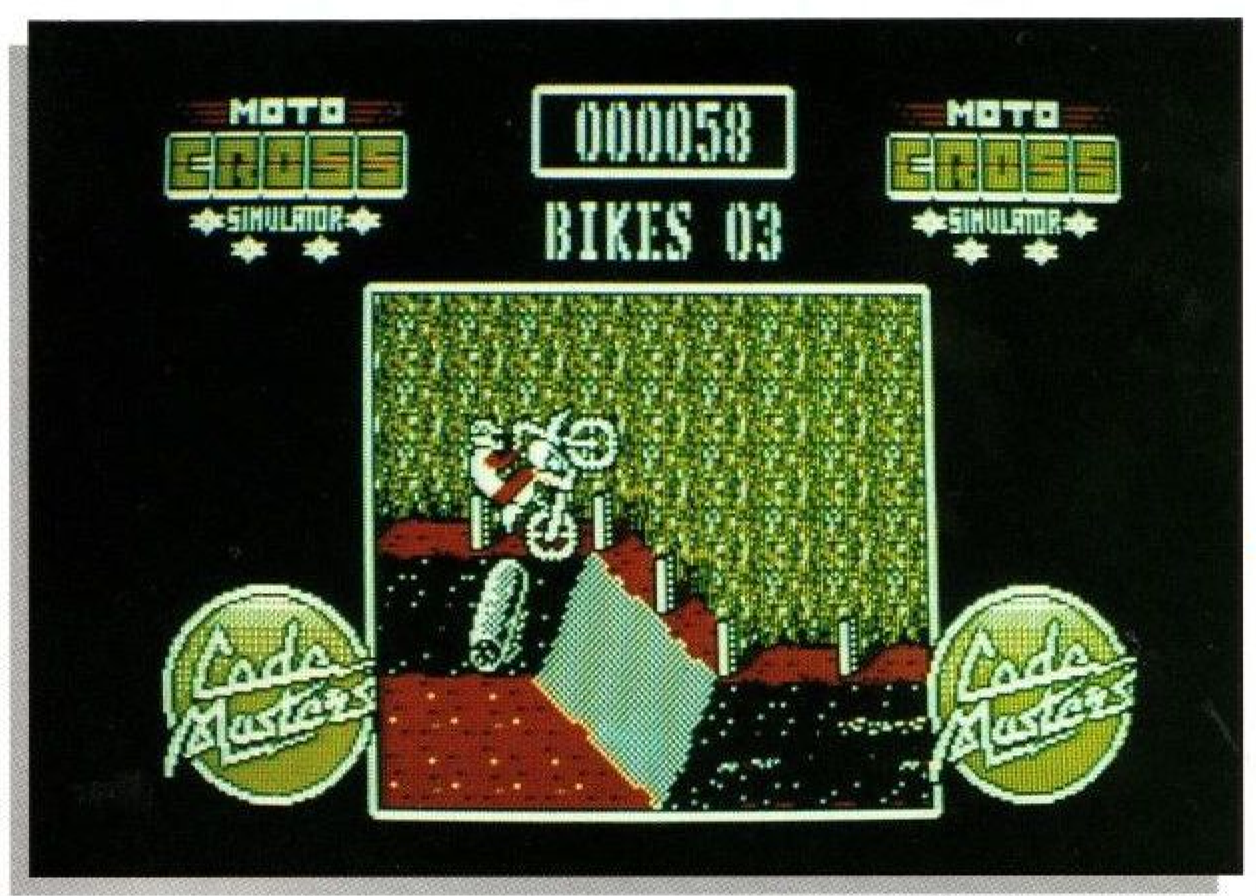
If Pretty Boy Synder was so good, what was the number one boxer like? I shuddered to think. Despite my veneer of cultured intelligensia, I thoroughly enjoyed Barry McGuigan's Boxing and its accompanying descent into animalistic savagery; the two-player option really brings out the caveman in people.

Simon Pipe

ROUND·UP

NAME	Barry McGuigan's Boxing		
SUPPLIER	Mastertronic	PRICE	£1.99
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

"I could have been a contender." Well perhaps, if only I was not cursed with such a feeble body.



Leader of the pack

Your mind may be out of balance but your bike better not be.

Forget those hazy days of motorbike madness. Throw away the leather armour, forget the Saturday night terrorising of the local population and relax with the gentler sport of motorcross.

On second thoughts, don't. This is not for the faint-hearted. That fateful crash is just beyond the horizon as you leap across crevices, rush headlong down slopes and brave the debris-dotted landscape. Your only hope of survival is nerves of steel, perfect balance and a complete lack of common sense. This is a sport of madmen who pit their machines against the forces of nature and the twisted minds of the course designers.

So how is all this achieved on the Amstrad? The game is split into two main events. The first takes place in a window at the centre of the screen. It shows a side-on view of your man and bike as they hurtle along the landscape. The art to staying on your bike rests in your ability to balance on one wheel and time the jumps with a reasonable degree of accuracy.

When jumping over obstacles you must land on your back wheel. That is satisfactory when tackling obstacles on a flat surface but when you land on a slope after a jump the bike tends to the direction of its gradient. This means that you must apply an opposite force with your joystick or your biker will bite the dust. When you have mastered the obstacles you then have to deal with the missing or sunken sections of the track. You do so by leaping into space, trying to land on your back wheel as you bounce across the track.

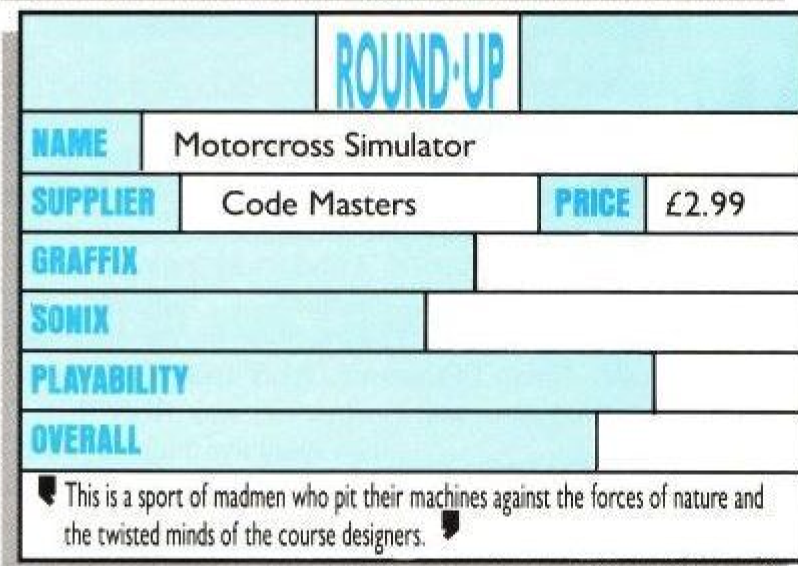
Prepare for many a frustrating moment as those early forays into motorbike madness are sure to end in disaster. A chart is provided to help with the timing but the technique itself involves lifting the front wheel over the obstacles and pressing the jump button before the back wheel strike the obstacle and you hit the dirt. If, after many hours of practice, you survive your journey across the track you move to the speed trials. Unlike the track, this section of the game is viewed from above. By steering left and right you avoid the boulders but the jumps are another matter altogether.

To clear impassible sections of the course you must resort to air travel. When launching from a ramp an image of your biker is displayed in the corner of the screen to enable you to judge and control your landing angle.

After successful completion of this section it is back to the first section with a different track. Definitely a difficult game but one with which it is worth persevering. The graphics and sound effects are by no means stunning but the control of your biker is good, allowing this game to become a real test of your skill.

Adrian Pumphrey





ROUND-UP

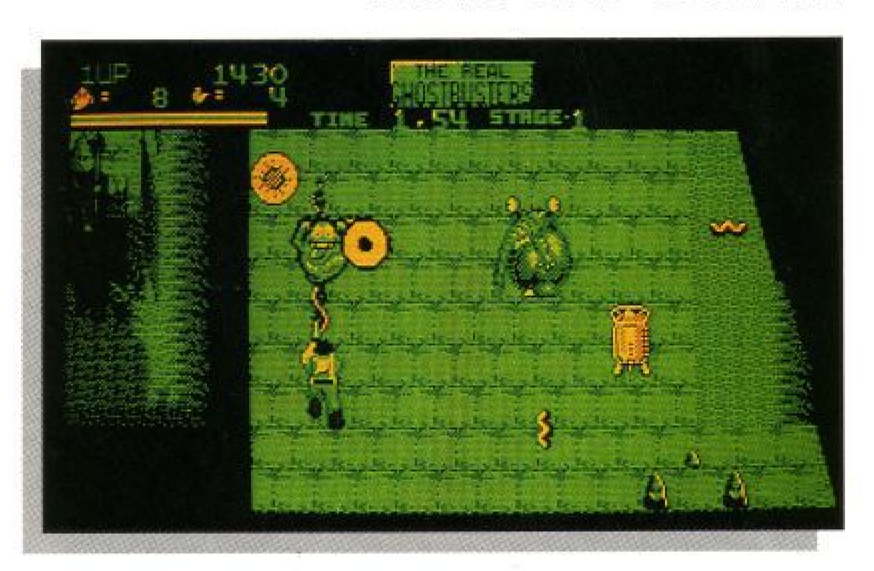
NAME	Motorcross Simulator
SUPPLIER	Code Masters
PRICE	£2.99
GRAFFIX	
SONIX	
PLAYABILITY	
OVERALL	

This is a sport of madmen who pit their machines against the forces of nature and the twisted minds of the course designers.



THE REAL GHOSTBUSTERS

YOU DON'T STAND A GHOST OF A CHANCE WHEN THESE BOYS GET GOING.



When you are playing *The Real Ghostbusters*, as opposed to the *False Ghostbusters* or *The Ghostbusters Who Weren't Much Good* I suggest you turn down the sound and put on the Ray Parker Jnr record or even hum the music. Great CPC music is not what you are getting.

The Real Ghostbusters is the conversion of the television cartoon serial which is basically there to cash in on the success of the hit movie. One could say the same about the game, because it is about as much fun as eating a disc.

I had a bad feeling from the moment I followed the instructions on the inlay and typed RUN"DISC. The correct instruction was RUN"RGB. I then spent five minutes playing hunt the fire key because it is not C, as the instructions would have you believe although you can can use the joystick to move round, and fire.

The plot for this excuse in marketing potential is that there are creatures everywhere. You must shoot them with your gun – limitless bullets – and then suck them into your backpack with your proton beam. Once you have cleared one level you have to do it again and again and again..

The setting beats me. Half the time it is almost impossible to tell what the scenery is – just that it is green. Yes, the colour scheme is rather disgusting. Four-colour graphics – red, yellow, black and plenty of green – crude eight-way scrolling, poor sprites and dodgy sprite detection are the main features of the game.

That aside what do you have to do? Scene one is set on the rooftops of the city. You are required to cross them to reach the end level guardian. Destroying this guardian liberates a key which will open the gateway to the next level. Between levels you unload your traps, bonus points being given for each captured ghost. Occasionally a captured ghost will yield a bonus.'

This can take several forms but the most useful is the summoning of Slimer. This friendly green spirit hovers round your location, seeing off any nasties which stray too close.

On level two you must scale a series of cliffs and face all manner of slimy beasts until encountering the end level guardian which resembles an eye on a elastic band.

Accurate manoeuvering is wishful thinking and all-action entertainment it is not.

Your bullets are big, about hand grenade size, so I am not surprised that they go through most of the monsters in one go.

The monsters are not defenceless, either. They have clammy hands, slimy tentacles, bolts of electricity, guns and that suspect sprite detection to help win the war for the force of vileness.

After half an hour I left them to it. The Real Ghostbusters is little more than a good marketing concept.

Mark Ulyatt

ROUND-UP

NAME	The Real Ghostbusters		
SUPPLIER	Activision	PRICE	£9.99
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

They have clammy hands, slimy tentacles, bolts of electricity, guns and suspect sprite detection on their side.

O.J. SOFTWARE

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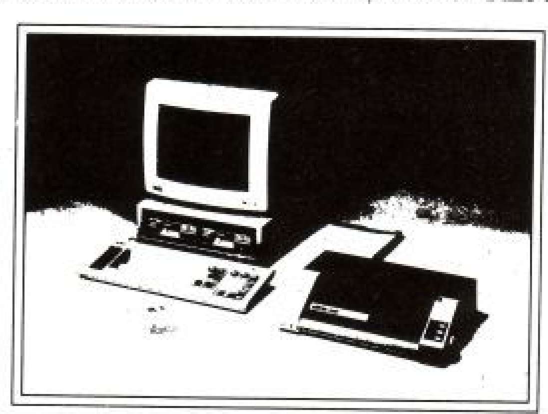
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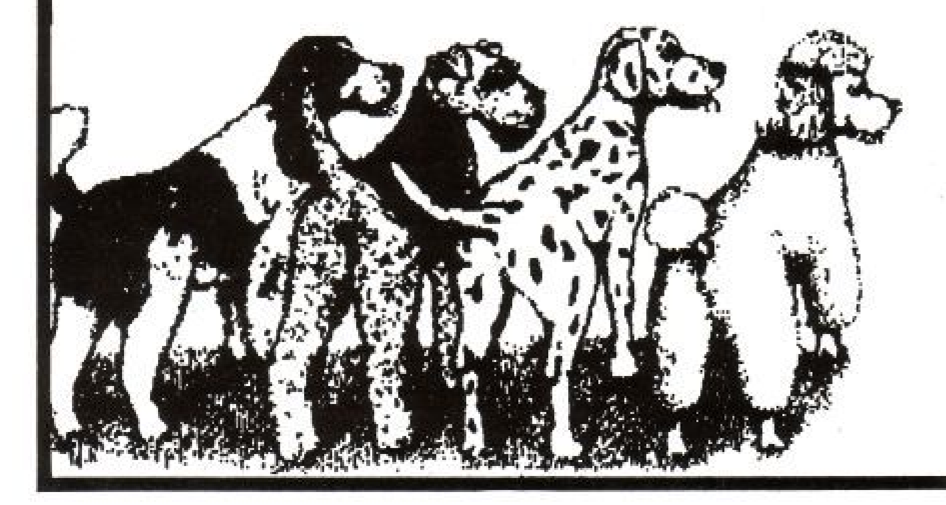
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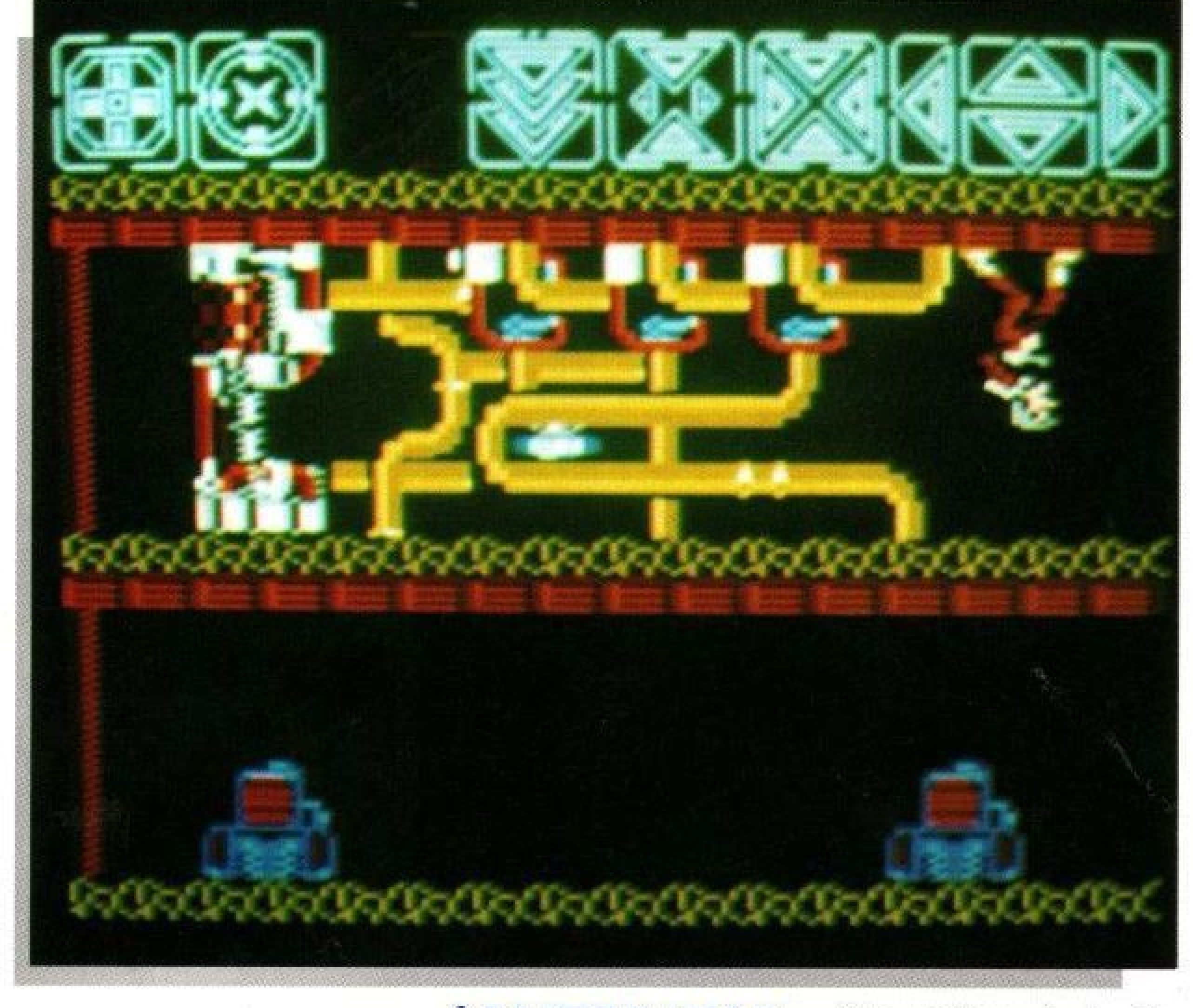
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OBLITERATOR

The game *Obliterator* has finally found it's way to the CPC, although one must sit and ponder why. The gameplay was never any good in previous incarnations and there was never enough depth to make playing worthwhile. Now, coupled with bad, jerky, slow graphics and hopeless action, it remains little more than a poor joke.

If this sounds an unfair comment, remember that Arnold owners have seen games like *Crazy Cars II*, *Emlyn Hughes International Soccer* and *Pacland* prove that the CPC is capable of producing stunning games. I will leave the final judgment to anybody also wishes to sample Obliterator themself but I would not recommend it and I would ask most to steer well clear.

Obliterator is so-called because of the job which you must take on. Some time ago you were the leader of a blood-thirsty pack of merciles heroes entitled, believe it or not, the Obliterators. Unfortunately they have all but disappeared; all but you that is and, as the last of the Obliterators, you have a very busy schedule.

The Federation of Council Elders is now in need of your services and, being a loyal and obedient servant, who are you to deny them? Therefore you stand on a spaceship with only a water pistol to guard you from the big, green things – they call them aliens, I think – and with not much chance to stay alive.

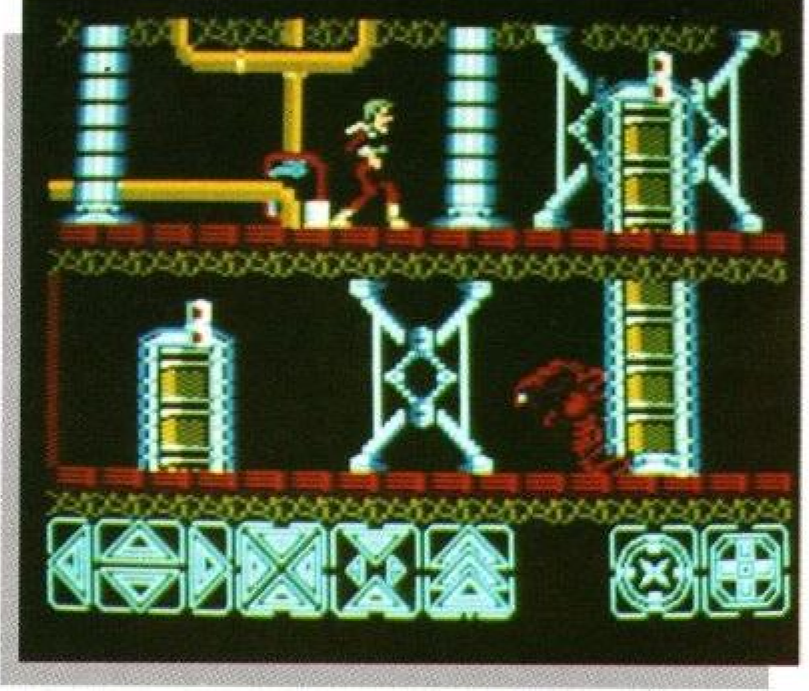
The ship in question is heading towards Earth, with the sole task of destroying the Federation's homeworld. Before it does so you must, in your designer boiler suit, shut down its plasma drive and disable the weapons system; there are also shields to be switched off, which is all in a day's work for a dedicated Obliterator.

Already the game has been criticised by some ST magazines as it has appeared previously in 16-bit form. This was done because of the ridiculous control system used for character actions in the form of icons which line the bottom of the screen, each of which perform a different task. I hate to say it but it makes the game unplayable.

The problem is in the selection of the control icons. Movement along these icons is achieved by pushing up and pulling down on the joystick. This moves the highlight across the icons which can then be selected by pressing the fire button. The disadvantage of this is that while you are selecting the icon you require you have no control over your man and the aliens are quick to take advantage of this fact. The only way to bypass this system is to pre-select the icon you are likely to need and when you hit that tricky situation all you have to do is press the fire button. This means you not only have to think ahead but you also have to get it correct first time, for the aliens are not forgiving foes.

The sound is also bad but the final nail in the coffin is the abysmal speed at which the graphics move; you can even outrun a laser bolt. I was not happy with Obliterator. It is the ideal cure for insomniacs with more potency than a mogodon.

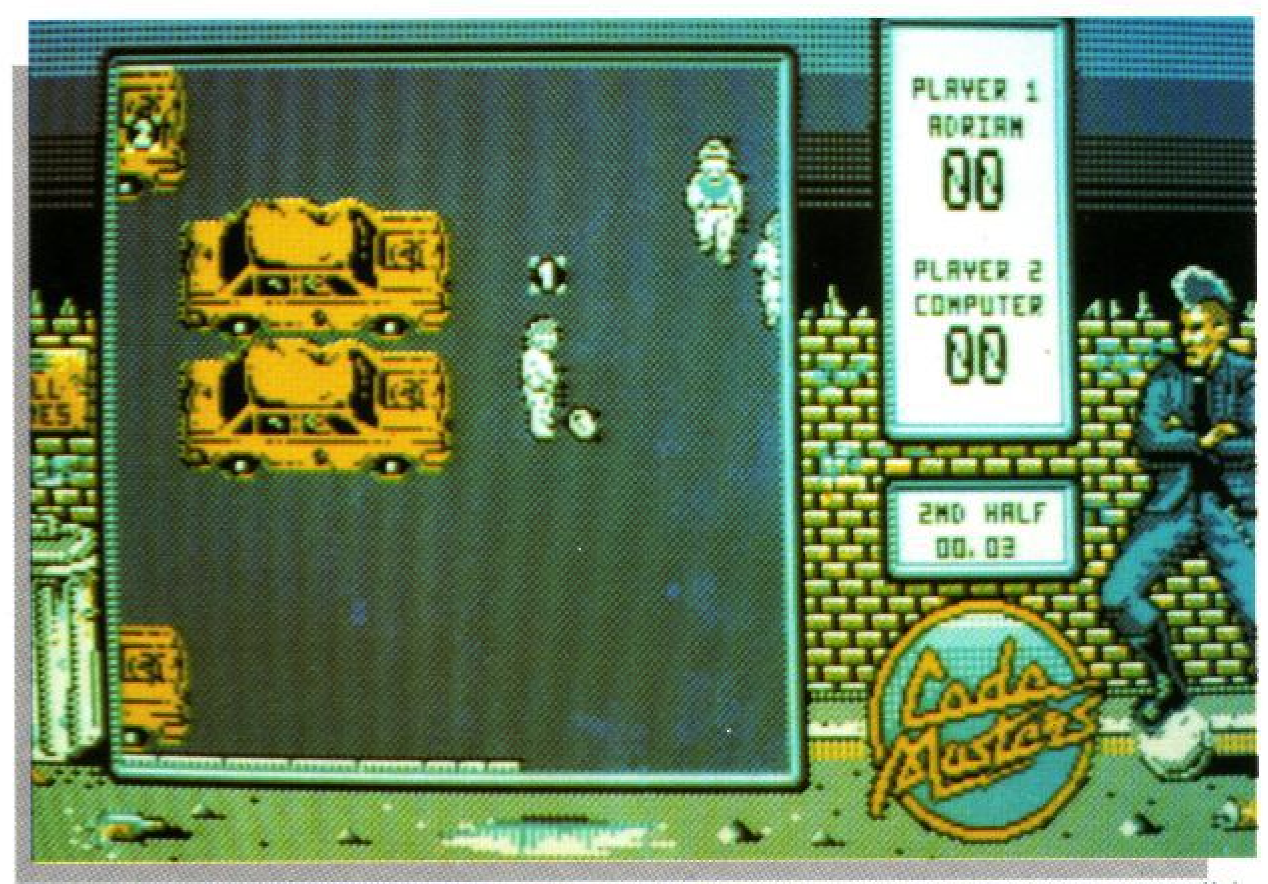
Richard Henderson



ROUND-UP

NAME	Obliterator		
SUPPLIER	Virgin Mastertronic	PRICE	£9.99/£14.99
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

"I hate to say it but it makes the game unplayable."



STREET GANG FOOTBALL

When you tire of kicking the ball kick your fellow players

Sometimes my Arnold thinks he is a Spectrum. When this inferiority complex strikes I normally slap him around, or even take him to a disc doctor to be sorted out. The most recent attack of this ghastly malady occurred as I was playing *Street Gang Football* from Code Masters. Small screen, lumpy scrolling and just about four-colour graphics with squeaky noises for sonics. Obviously Spectrumitus.

SGF pitches two gangs against each other in all-action, bloodthirsty, nose-biting, groin-gouging, mass mayhem slaughter frenzy. Yes, it is football time again, this time not on the sacred turf but on the grimy streets, with cars and walls and the stupid old fellow next door who always kept the ball.

Either play against the computer – three skill levels – or a friend, in multi-colour – some of them different – action. Play is fairly standard in highlighting the player under control, which can be changed when off the ball by pressing the fire button.

Dribbling is easy – so easy I would recommend this lot sign for England – and shooting is a case of holding down the fire button for an increasing strength of shot.

If you are winning the game and wish to indulge in a little time wasting nothing could be simpler. All you have to do is take the ball and disappear behind the parked cars – it would take an army to get you out of there.

Life would be great if theory converted into reality but unfortunately in this case it does not. For one thing the game has some serious bugs. The ball finished just in front of my goal, with no-one but the keeper on-screen. He cannot move off the line and none of the other players showed the slightest inclination to appear on-screen. Even after I switched control marker – but not the player himself – he would move up and down but not across on to the screen.

The rest of the game ticked away for a frustrating draw. Then we had players who became invisible and the program crashing twice in mid-game. For a commercial game that is ridiculous.

Should you be able to play a game, a fracas between the two teams is almost inevitable but, unfortunately, is preceded by a monotonous string of comments from all the players. This becomes even more monotonous if after all the arguing they decide to continue playing.

If fisticuffs follow it is a matter of fierce joystick-waggling to defeat the opposing thug by reducing his energy to zero. The arguments invariably start when you score a goal.

Besides the bugs in the program it suffers from the fact that it scrolls badly, the gameplay is turgid, the sonics insignificant and boredom immense.

Code Masters is capable of producing simple yet playable games but this one has few redeeming features.

Mark Ulyatt



ROUND-UP

NAME	Street Gang Football		
SUPPLIER	Code Masters	PRICE	£2.99
GRAFFIX			
SONIX			
PLAYABILITY			
OVERALL			

"Dribbling is easy, so easy I would recommend this lot sign for England."

BrunWord

BrunWord 6128 £30.00

BrunWord 6128 is specially written for the Amstrad CPC6128. Months were spent just optimising the routines into their smallest, most efficient form. The result is the fastest, most convenient word processor for this computer, complete with the fastest spelling checker and a card filing programme for mail merging. Whether you are writing a few letters or a complete novel, you will find no better assistant than BrunWord.

The word processor, spelling checker and 30,000 word dictionary, are all loaded into memory by typing RUN "BRUNWORD". The disc drive is then completely free for your data disc.

All other word processors, even the ROM versions, need to access the programme disc to test the spelling. (ROM versions have the dictionary on disc). This is slow and can involve many disc changes. For example, Protext needed the disc to be changed eight times to check the spelling of our test file, whereas BrunWord needed no disc in the drive.

The 40 page BrunWord manual has several detailed examples, starting with step by step instructions to produce and print a simple letter. But your very first step is to load the TUTOR file into BrunWord. This takes even the complete novice straight into word processing and demonstrates the powerful editing and formatting features of BrunWord. There are also examples of printer control, showing how to create headings, to underline or to emphasis, and five deliberate spelling errors for you to correct. The tutor takes about 20 minutes to run through and after that you will feel confident to type in your own text.

BrunWord Features

*40, 80 or 128 column display *Touch typing speed over 200 words/min *True insert or overwrite *Justify or unjustify paragraph or whole text *Justified text has balanced appearance *Instant word wrap *Block save, move, copy, insert and delete *Local editing with word delete/undelete *Adjustable margins and TABs *Column/Line/Page display with file name *True word count *Find and replace *Help menus *Memory filing system *Single character embedded printer commands (18 with 3 printer codes and 21 with 10 printer codes) *Page throw markers *Multiple copies *Odd/even page headers/footers with page numbers *Multi file printing (new page or continuous) *Print specified pages *Works with any printer *True display superscript and subscript numbers *User defined print characters *Load ASCII files from other word processors *Save ASCII files for other word processors *Files can be encrypted *Maximum file size about 9 pages of text.

BrunSpell Features

*Memory resident with word processor *Checks 4,000 words/min *30,000 word dictionary *No American spellings *Add up to 5,000 of your own words *Instant lookup *Helps to find correct spelling *Automatic correction.

DataFile Features

*Alphabetical, numerical, date sorting on any field *User defined headings *Search routine *Data merging into BrunWord *Label printing.

BrunWord Junior £18.00

Low cost version of BrunWord 6128 on 3 inch disc, including the spelling checker, 30,000 word dictionary, TUTOR file and manual. Holds just one page of text and cannot save words to the dictionary. Otherwise as BrunWord 6128. Up grade later to the full BrunWord for just £14.00

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BrunWord Elite £90.00

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We have written a booklet all about it but to give you just a flavour....... The text of this advertisement was printed directly in three columns using BrunWord Elite, a CPC6128, an 8 bit printer port and a Citizen HQP45 24 pin printer. Observe the superb proportional fonts downloaded directly from BrunWord Elite. Observe the equal spacing between words and the balanced filling of each line of text according to the true length of the proportional characters. Observe the correct use of the smaller font with more characters per line and narrower line spacing.

BrunWord Elite gives you almost desk top publishing capability, with the speed, the quality and the convenience of word processing. The whole programme is memory resident INCLUDING THE SPELLING CHECKER AND THE DICTIONARY.

The text of this advertisement was typed into BrunWord Elite, spell checked and then printed on one A3 sheet. The only essential access to the disc was during printing, to download the three proportional fonts. The total printing time was just 7 min 30 sec, printing each line twice and using uni-direction printing to achieve the sharpest characters. We had photocopied our standard advertisement outline onto the sheet. The lines were drawn with pen and ink, and the A3 page photographically reduced to A4 size.

In principle, BrunWord Elite could have printed this entire advertisement in one operation, as it can download a bit image file directly from the disc to the printer, while in the middle of printing. However, digitised graphics might be good enough to compliment a 9 pin printer but the HQP45 deserves better.

For the complete story of BrunWord Elite, send for a free copy of "BrunWord and Printer". This booklet includes a description of all our programmes and a critical comparison of several 24 pin printers. Make sure you read this booklet before buying a printer.

Comparisons

We have tested BrunWord 6128, Protext (disc) and Tasword 6128 with the same file of 3366 words.

BrunWord scrolled 40% faster than Protext which in turn scrolled 19% faster than Tasword.

Protext was the fastest to justify but needed a separate operation to see the result. BrunWord produced the best appearance of all three and was 30 times faster than Tasword.

Our simulated typing test reached 218 words per minute. Both BrunWord and Protext had no trouble at this speed but Tasword was very slow inserting text into the start of a paragraph and could only handle 16 words per minute.

The spelling test checked all 3366 words. BrunSpell took 52 seconds and needed no disc changes. Prospell took 6 min 24 sec and needed 8 disc changes. Taspell took 18 min 46 sec and needed 3 disc changes.

Info-Script £50.00

The great power of any database is only realised when the data can be put to use. A database system is centred around saving, sorting, finding and displaying the data. Obviously, very essential features but only if there is a purpose to storing the data. That purpose might be names and addresses for mail merging, a stock list of items being sold that generates a buying list, a catalogue of your compact disc recordings so that you can take a printout with you to the shop, a catalogue of recipes so that you can have a print out in the kitchen of the in-season treats, a catalogue of garden activities that gives you a reminder list to hang in the garden shed.......

The common element being the need to take the data away from the computer, in a form that suits your immediate requirement.

We gave considerable thought to this and concluded that the only solution was a proper text handling system within the database itself. In other words, a word processor. We looked into designing a special word processor but quickly realised that BrunWord, with its memory filing system, is ideal.

This is the exciting concept of Info-Script. A comprehensive relational database integrated with a powerful word processor, giving total flexibility to the way that the data is printed. A fast, user friendly combination that has the depth of power to keep up with your needs. A mail shot, a restaurant wine list, a summary of expenses.......

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Send your BrunWord 6128 disc, BrunWord manual (not the packing) and a cheque for £22.00. We will record Info-Script, test the disc and return with a new manual.

Letters

I am writing to say how much I enjoy using the BrunWord disc. It is easy to use and as I am not a good speller the dictionary is most essential. I dislike writing letters but the disc makes it easy and much more exciting.
Clare (age 12 - Herefordshire)

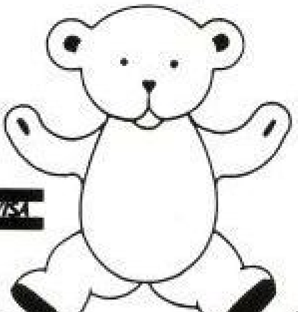
I wish to upgrade (BrunWord) to Info-Script. May I congratulate you once again on a superb product, without which I would be lost.
Mr L (Nottingham)

I have been using BrunWord for quite a while and like it very much. I have told my friends how good and user friendly it is. Also the speed and ease of commands. I enclose cheque for updating to Info-Script.
Mr G (Scotland)

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Mr McQ (Leicester)

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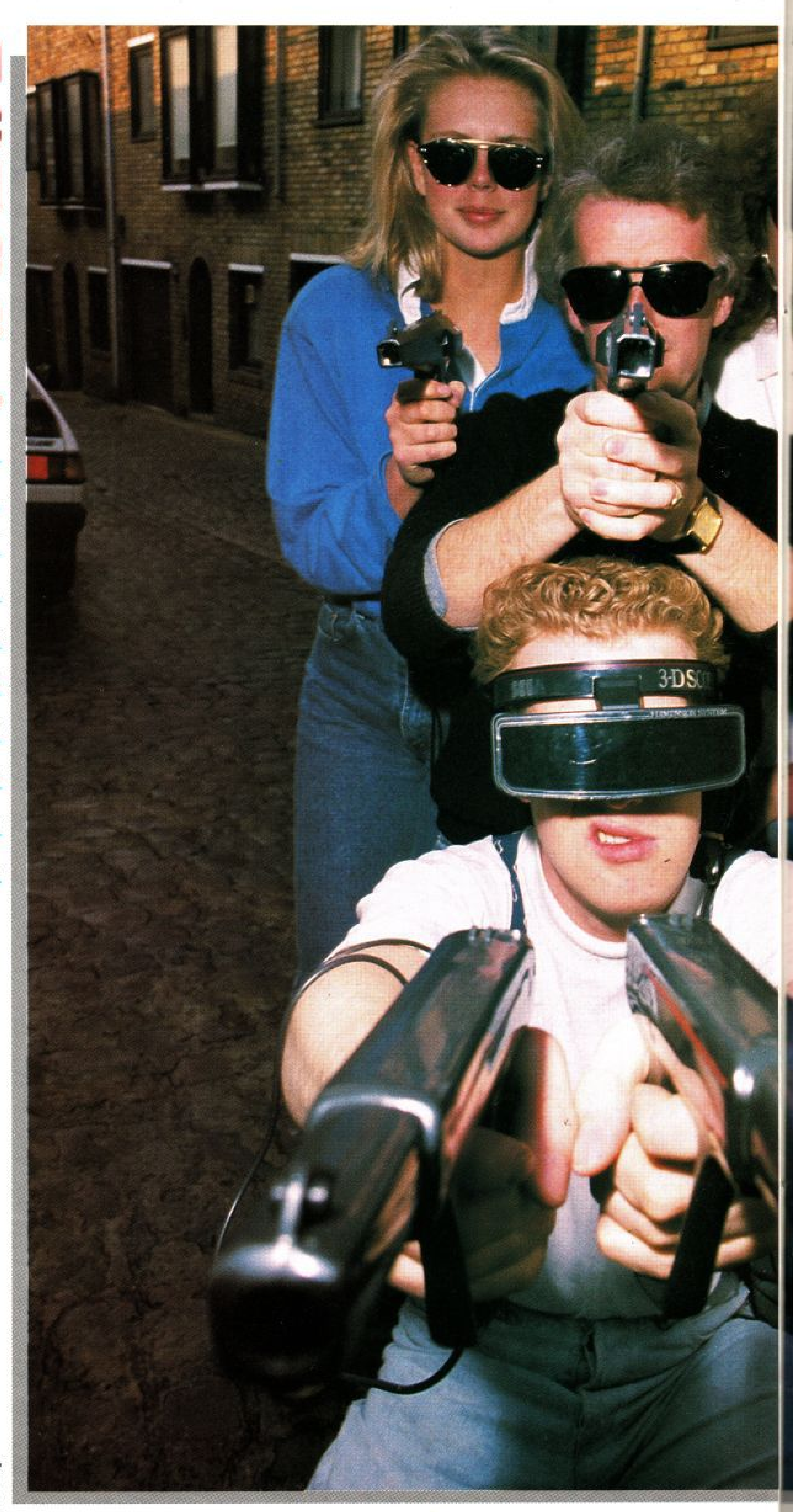


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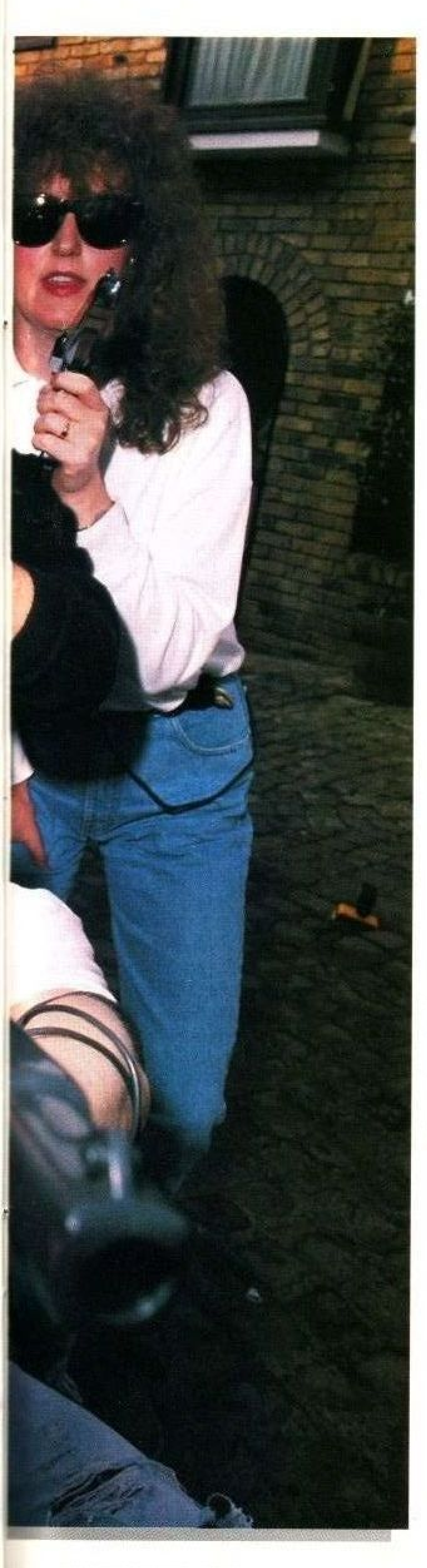
Virgin Mastertronic determined to stay at the top of the heap.

Adrian Pumphrey, staff writer extraordinaire, meets the people behind the two companies brought together to form one of the industry's giants.



Lynching mob looking for competitors.

From the left at the back: Andrew Wright, Lisa Wilkinson, Lesley Walker. Front: Brynn Gilmore.



Through the wastes of time came a band of warriors, each determined to blaze a trail across the land, going where no being has gone before. Once such innovator was the company Mastertronic. Through its dedication to the budget game it helped set new standards in the software industry.

After the company launch in 1984 Mastertronic began to produce software for less than £2. Despite the low price, budget software proved to be very profitable, so much so that in 1987 it was able to buy the Australian outfit Malbourne House. With that added string to its bow Mastertronic became a juicy morsel for the Branson machine.

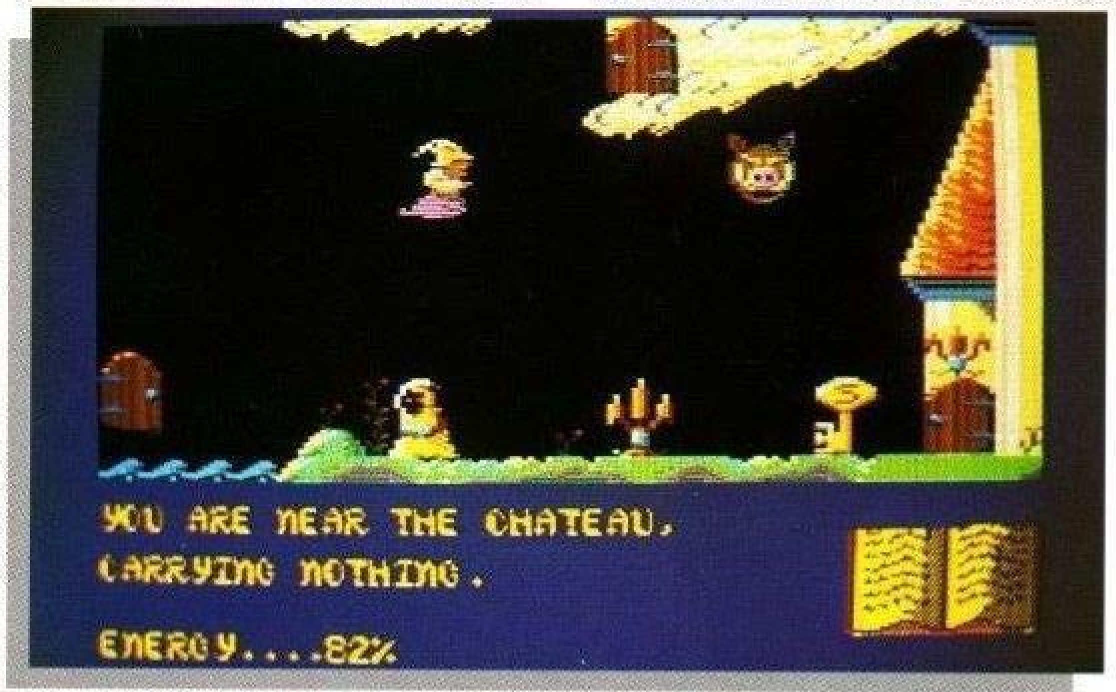
The first major hit on the Amstrad for Virgin Games was *Sorcery*. Originally the game was written by Martin Wheeler on the Spectrum but Dave Chapman, a keen Sorcery fan, was experimenting with the Amstrad in his spare time. As a result he produced a simple version of Sorcery. The game showed promise, so it was decided that he should continue to produce a complete conversion for the Amstrad.

When released the game was an instant hit. That helped to launch Virgin Games and enabled it to reach the status it currently holds with Mastertronic, a far cry from the Virgin Games bus which used to tour the schools and television shows promoting computer games.

The acquisition of Leisure Genius in 1986 proved to be one of the software industry's better moves. It gave Virgin Games the clout it needed to merge successfully with Mastertronic several years later, although Virgin Games bought 45 percent of the company first in 1987 before going all the way with a complete buy-out.

With the creation of Virgin Mastertronic in 1988 the company became one of the five biggest computer software companies in the world. Virgin did not go to the deal empty-handed as it took with it the Leisure Genius label. This label is run by Virgin-owned Winchester Holdings. The attraction of this company to Virgin is the number of board game licences it holds. Through Leisure Genius many such classics such as *Monopoly*, *Scrabble* and the award-winning *Risk* have been released. With the acquisition of the Sega licence Virgin Mastertronic became a company of five distinct parts.

The main Mastertronic label will continue with its budget software releases, both 16-bit and 8-bit. Melbourne House will continue with its full-price arcade and adventure games. Leisure Genius will stay with the board game conversions; Sega with both the hardware and the firmware products; and, finally, Virgin Games is set for a re-launch later this year. The first product on the Virgin Games label will be *Silkworm*.



Sorcery conjuring a little magic on the Amstrad.

Virgin Mastertronic is proud of its Sega operations and plans to invest a significant proportion of company resources into promoting the product. To this effect Phillip Ley has been appointed to handle the sales and promotion of the Saga range of products. Not that he will have a problem, as the company is selling the stuff faster that it is coming in.

Although sales in the U.S. belong mainly to Nintendo, Virgin Mastertronic has a firm hold on the U.K. market. Fears about the possible threat of the PC Engine are slight, as the Sega range is too well-established to suffer from competition at this stage of the game.

Virgin Mastertronic is very interested in pushing the Sega range

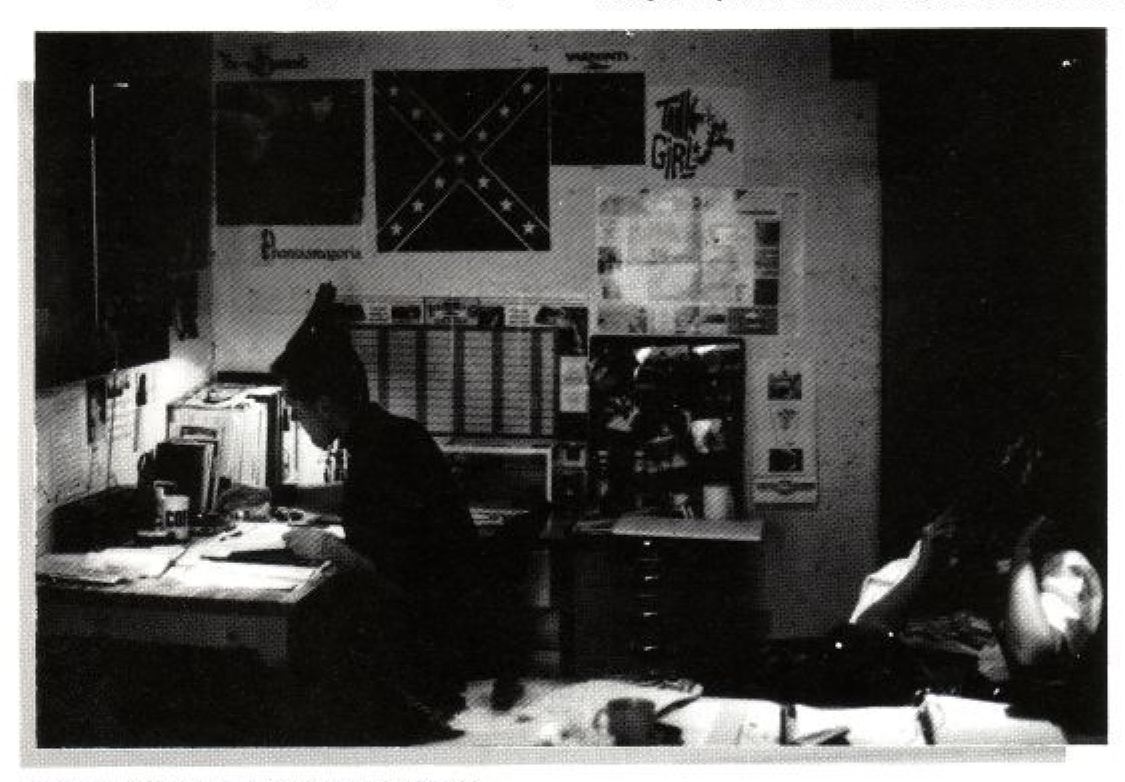


of products in Europe. It has set up offices in Germany and France. One of the bonuses of the Sega system is that because 45 percent of Sega buyers have not previously owned a computer, the market is expanding without taking users from the home computer market.

Apart from the branch offices in France and Germany, there is Virgin Mastertronic Inc in the U.S. just outside Los Angeles promoting its products. Set up approximately four years ago, this branch used to be owned by Mastertronic but with the buy-out it also became part of the Virgin group.



Intrepid reporter catches Brynn from behind portable jungle.



Two people looking busy for photograph.

The American office is taking over the distribution of the Leisure Genius



range, which was handled previously by Electronic Arts. The American branch is doubly important because most of the software sold by the company is developed in the States. That is because Virgin Mastertronic knows of several programming teams which produce exceptional work.

One such product being developed is based on the *Marvel* cult comic hero, the *Silver Surfer*. A series of sports titles is also being developed in the States. They will run together to form a theme, though there are no plans to create a separate sports label – at least not a permanent label. The sports include soccer, baseball, basketball and ice hockey.

In the U.K. the programming team has evolved to become a series of product managers. They are responsible for overseeing the various projects being produced by outside development houses. Virgin Mastertronic believes that the days when a lone programmer handled the process from conception to cash in pocket are long gone. It is now the turn of the large companies which have the money and resources to help a product achieve its full potential.

Although this is not necessarily a good thing, that is how things are. One advantage is the fact that money is ploughed back into the industry and the quality of the products is rising continually. As a result, budget software now being released is far superior to full-price software of three or four years ago.

Virgin Mastertronic has noticed that as the market develops the Amiga is starting to take over from the ST in the 16-bit arena but the long-predicted collapse of the 8-bit market has failed to materialise and shows no sign of doing so. Most of the speculation about the collapse of the 8-bit market has been from people in the trade and not from the people who buy the products. As far as Virgin Mastertronic is concerned the more people who drop out of the Amstrad market the more there will be for it.

The company now resides just off Portobello Road in London. Once past the smiling secretary with a copy of the latest Jackie Collins book on her desk, you enter a building with a secret. The offices used to be stables at one time and it is said that somebody hanged himself from one of the beams in the upper part of the building – no doubt a fate now reserved for the competitors. in those cheery surroundings Virgin Mastertronic will continue to produce software on its many labels at both full and budget prices for many years.

The instructions for this game are simple, as they should be, since the game is aimed at younger readers. You are required to select one of the six groups indicated at the beginning of the game. After selection you will be shown a picture of an item from that group and a list of all the items in that group.

You must hit Enter when the correct item name is highlighted. Correct selection will result in a jolly tune. If you select the incorrect name the reward is a rude noise and another attempt. Three attempts and you move to the next item. At the end of each group your score will be given.

WHAT AM I?

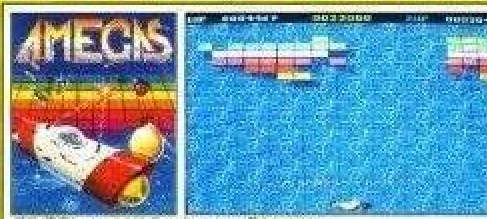
```
10 REM ****************
20 REM *              *
30 REM *  What am I?  *
40 REM *      by      *
50 REM *    Marion    *
60 REM *    Clarke    *
70 REM *              *
80 REM ****************
90 '
100 SYMBOL AFTER 165:SYMBOL 165,0,0,0,0,12,30,30,63:SYMBOL 166,0,0,0,0,48,120,12
0,252
110 SYMBOL 168,1,1,3,3,7,7,15,15:SYMBOL 169,128,128,192,192,224,224,240,240:SYMB
OL 170,0,60,255,255,255,255,255,255:SYMBOL 171,0,0,0,195,255,255,255,255
120 ENT 1,25,1,1:DIM w$(36):FOR f=1 TO 36:READ w$(f):NEXT
130 DATA house,bed,table,chair,television,ladder,fish,elephant,tree,bird,flower,
mouse,teddybear,ball,snowman,boat,car,book,candle,pencil,mug,flag,boot,bag,star,
triangle,square,circle,cross,line,red,blue,green,yellow,black,white
140 CALL &BC02:MODE 1:INK 0,26:INK 1,6:INK 2,2:INK 3,3:INK 4,20:INK 6,15:INK 9,2
4:INK 14,25:INK 15,9:GOSUB 510:PEN 1:LOCATE 14,2:PRINT"WHAT AM I ?"
150 PEN 2:LOCATE 1,5:FOR z=1 TO 13:READ z$:PRINT z$:NEXT:PEN 1:LOCATE 8,21:PRINT
"PRESS SPACE TO SEE GROUPS":WHILE INKEY$<>"":WEND:WHILE INKEY$<>" ":WEND
160 DATA "   This game is designed as an aid","   to early literacy."," "
170 DATA "   The words provided are split into","   groups of six."," "
180 DATA "   A picture from the selected group","   is displayed together with a
ll","   the words in the group."," "
190 DATA "   Each word is highlighted in turn","   and can be selected by pressi
ng","   ENTER."
200 CLS:LOCATE 1,6:FOR e=0 TO 9 STEP 9:FOR f=0 TO 6:FOR g=0 TO 2:LOCATE g*13+2,e
+f+2:IF f=0 THEN PEN 1:PRINT"Group";e\3+g+1; ELSE PRINT w$(e*2+f+g*6);
210 NEXT:IF f=0 THEN PEN 2
220 NEXT:NEXT:PEN 3:LOCATE 9,21:PRINT"Selected group : ";:WHILE INKEY$<>"":WEND
230 g$=INKEY$:IF g$="" THEN 230 ELSE g=INSTR("123456",g$):IF g=0 THEN 230 ELSE P
RINT g$;:FOR x=1 TO 1000:NEXT:FOR x=1 TO 6:g(x)=0:NEXT
240 MODE 0:BORDER 16:PAPER 14:CLS:WINDOW 10,19,2,19:WINDOW #1,2,9,2,19:WINDOW #2
,1,20,21,25:PAPER #1,14:PAPER #2,0:CLS #2:WINDOW #2,2,19,22,24:PEN #2,5
250 PLOT 0,0,3:DRAW 0,398:DRAW 638,398:DRAW 638,0:DRAW 0,0:PLOT 0,80,3:DRAW 638,
80:r=0:n=0:s=6*(g-1)+1
```

```
260 WHILE r+n<6:FOR x=1 TO 500:NEXT
270 a=INT(RND*6):IF g(a+1)>0 THEN 270 ELSE g(a+1)=1:a=a+s:IF w$(a)="*" THEN r=r+
1:GOTO 270
280 b=INT(RND*6):c=a-b:IF c<s THEN c=c+6
290 ON a GOSUB 550,580,610,630,650,680,690,710,750,770,800,840,870,910,930,970,1
010,1040,1080,1100,1120,1140,1180,1200,1230,1250,1260,1270,1290,1310,1320,1330,1
340,1350,1360,1370:t=0
300 CLS:cc=c:PEN 15:FOR x=1 TO 6:IF cc>s+5 THEN cc=s
310 LOCATE 1,x*3-1:PRINT w$(cc);:cc=cc+1:NEXT:GOSUB 520:FOR w=1 TO 3:cc=c:FOR x=
1 TO 6:y=x-1:IF y=0 THEN y=6
320 LOCATE 1,y*3-1:PEN 15:IF cc>s+5 OR cc=s THEN PRINT w$(s+5):cc=s ELSE PRINT w
$(cc-1)
330 PEN 1:LOCATE 1,x*3-1:PRINT w$(cc):cc=cc+1:SOUND 1,239,2:FOR f=1 TO 400:IF IN
KEY(6)=0 THEN tt=1 ELSE NEXT:NEXT:NEXT:tt=0:x=6
340 t=t+1:IF a=cc-1 AND tt=1 THEN GOSUB 370:GOTO 260 ELSE GOSUB 460:IF t=3 THEN
260 ELSE GOSUB 520:GOTO 300
350 WEND:MODE 1:GOSUB 510:PEN 1:LOCATE 15,2:PRINT"SCORECARD":LOCATE 15,3:PRINT S
TRING$(9,CHR$(208)):LOCATE 11,8:PEN 2:PRINT"You got";r;"out of 6":IF n=0 THEN LO
CATE 12,13:PRINT"CONGRATULATIONS!"
360 PEN 1:LOCATE 13,19:PRINT"Another Game ?":WHILE INKEY$<>"":WEND:k$="":WHILE I
NSTR(" YN",k$)<2:k$=UPPER$(INKEY$):WEND:IF k$="Y" THEN 200 ELSE CALL &BC02:MODE
1:END
370 INK 12,2,7:RESTORE 440:f=0:ON SQ(2) GOSUB 410
380 PEN 12:FOR y=1 TO 6:LOCATE 1,y*3-1:IF y<>x THEN PRINT SPACE$(10); ELSE PRINT
 w$(cc-1);
390 NEXT:BORDER 7,2:CLS #2:PEN #2,1:PRINT #2,"YES! ";:IF a=8 THEN PRINT #2,"an "
; ELSE IF g<>6 THEN PRINT #2,"A ";
400 PRINT #2,w$(cc-1);"!";:GOSUB 530:ON SQ(2) GOSUB 430:BORDER 16:CLS:CLS #1:CLS
 #2:r=r+1:RETURN
410 f=f+1:IF f=36 THEN f=0:RESTORE 440:GOTO 410 ELSE READ tp,ln:IF tp=0 THEN SOU
ND 2,0,1 ELSE SOUND 2,tp,15*ln
420 ON SQ(2) GOSUB 410:RETURN
430 SOUND 129,0,1:WHILE SQ(2)>4:WEND:RETURN
440 DATA 106,2,127,1,119,2,142,1,106,2,127,1,159,2,0,0,159,1,142,2,127,1,119,1,1
27,1,142,1,106,2,127,1,159,3
450 DATA 106,2,127,1,119,1,106,1,95,1,106,2,127,1,159,2,0,0,159,1,142,2,127,1,11
9,1,127,1,142,1,106,2,127,1,159,3
460 CLS #2:SOUND 1,478,30,8,,1:SOUND 1,478,15,0:SOUND 1,716,50,8:PEN 15:LOCATE 1
,x*3-1:PRINT w$(cc-1):IF t>1 THEN PEN 5 ELSE INK 12,0,9:PEN 12
470 LOCATE 1,b*3+2:PRINT w$(a):IF t=1 THEN 490 ELSE FOR x=1 TO 6:IF x<>b+1 THEN
LOCATE 1,x*3-1:PRINT SPACE$(10);
480 NEXT:IF t=3 THEN n=n+1:LOCATE #2,6,1:PRINT #2,"Oh dear!";:GOTO 530
490 IF tt=0 THEN LOCATE #2,5,1 ELSE LOCATE #2,3,1:PRINT #2,"No - ";
500 PRINT #2,"try again";:GOTO 530
510 BORDER 13:PAPER 0:CLS:PLOT 0,0,3:DRAW 0,398:DRAW 638,398:DRAW 638,0:DRAW 0,0
:WINDOW 2,39,2,24:RETURN
520 CLS #2:LOCATE #2,5,2:PRINT #2,"What am I?":RETURN
530 PEN #2,5:LOCATE #2,12,3:PRINT #2,"<space>";:WHILE INKEY$<>"":WEND:WHILE INKE
Y$<>" ":WEND:CLS:CLS #2:RETURN
```

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540 FOR w=1 TO v:READ x,y:DRAWR x,y:NEXT:RETURN
550 CLS #1:RESTORE 570:PEN #1,1:FOR x=1 TO 3:LOCATE #1,1,x+4:FOR y=1 TO 6:READ z
:PRINT #1,CHR$(z);:NEXT:NEXT:FOR x=1 TO 5:LOCATE #1,1,x+7:FOR y=1 TO 6:READ z:IF
 z=149 THEN PAPER #1,13:PEN #1,0 ELSE PAPER #1,14:PEN #1,3
560 PRINT #1,CHR$(z);:NEXT:NEXT:PLOT 112,192,3:DRAWR 32,0:MOVER -8,8:FILL 11:FOR
 w=0 TO 4 STEP 2:PLOT 120,216-w,5:DRAWR 4,0:NEXT:RETURN
570 DATA 32,32,214,215,32,32,32,214,143,143,143,32,214,143,143,143,143,215,138,1
43,143,143,143,133,138,149,135,139,149,133,138,149,133,138,149,133,138,143,133,1
38,143,133,138,143,133,138,143,133
580 CLS #1:RESTORE 600:PLOT 48,216,6:v=8:GOSUB 540:MOVER 12,12:FILL 11:MOVE 104,
288:v=4:GOSUB 540:MOVER 12,12:FILL 0:MOVE 48,264:DRAWR 48,-10:PLOT 190,190:DRAWR
 0,16:PLOT 246,212:DRAWR 0,16
590 PLOT 86,216,10:v=7:GOSUB 540:MOVER 12,12:FILL 4:PLOT 92,256:v=4:GOSUB 540:RE
TURN
600 DATA 0,56,8,32,12,16,12,4,12,-4,12,-16,0,-16,-56,-24,52,-12,-60,-22,0,-24,-4
8,10,0,40,36,16,20,8,108,-20,0,-40,-56,-24,-108,20,100,-20,0,-40,0,40,56,24
610 CLS #1:RESTORE 620:PLOT 48,192,3:v=6:GOSUB 540:MOVER 16,6:FILL 6:PLOT 48,256
:v=3:GOSUB 540:PLOT 112,224:DRAWR 0,26:PLOT 160,192:DRAWR 0,64:RETURN
620 DATA 0,64,64,32,112,0,0,-6,-64,-32,-112,0,112,0,64,32,0,-64
630 CLS #1:RESTORE 640:PLOT 168,208,3:v=6:GOSUB 540:MOVER -8,0:FILL 6:PLOT 168,2
48:v=3:GOSUB 540:FOR w=1 TO 3:READ x,y:PLOT x,y:READ x,y:DRAWR x,y:NEXT:FOR w=1
TO 4:DRAWR 0,-56:MOVER -8,52:NEXT:RETURN
640 DATA 0,40,-48,0,-24,-12,0,-4,48,0,24,12,-24,-12,-48,0,0,-40,144,196,0,40,120
,208,0,24,96,292,24,12
650 CLS #1:RESTORE 670:PLOT 56,256,5:v=6:GOSUB 540:MOVER 20,-8:v=8:GOSUB 540:PLO
T 142,250:v=4:GOSUB 540:MOVER 0,8:FILL 3:MOVER 8,-16:FILL 8:MOVER -20,-16:FILL 1
3
660 PLOT 56,256:v=4:GOSUB 540:PLOT 142,246:FOR w=1 TO 13:DRAWR 16,0:MOVER -16,-4
:NEXT:LOCATE #1,3,11:PAPER #1,13:PEN #1,7:PRINT #1,CHR$(251):LOCATE #1,2,10:PEN
#1,2:PRINT #1,CHR$(22)+CHR$(1)+CHR$(144):PAPER #1,14:RETURN
670 DATA 0,-64,112,0,32,16,0,64,-112,0,-32,-16,-8,-8,0,-32,8,-8,48,0,8,8,0,32,-8
,8,-48,0,0,-52,20,0,0,52,-20,0,112,0,32,16,-32,-16,0,-64
680 CLS #1:FOR w=0 TO 1:PLOT 64+48*w,144-16*w,3:DRAWR 128,192:MOVER -128,-188:DR
AWR 126,188:NEXT:PLOT 80,168:FOR x=1 TO 7:DRAWR 48,-16:MOVER -32,40:NEXT:RETURN
690 CLS #1:RESTORE 700:PLOT 64,224,10:v=21:GOSUB 540:MOVER 8,8:FILL 4:FOR w=0 TO
 4 STEP 2:PLOT 112,256-w,5:DRAWR 4,0:NEXT:PEN #1,10:LOCATE #1,1,9:PRINT #1,"o":L
OCATE #1,1,7:PRINT #1,"o":LOCATE #1,2,5:PRINT #1,"o":RETURN
700 DATA 0,16,32,32,16,8,32,0,32,-24,32,-16,32,16,16,16,0,-16,-16,-24,16,-24,0,-
16,-16,16,-32,16,-32,-16,-32,-24,-32,0,-16,8,-24,24,16,16,-24,-8
710 CLS #1:RESTORE 730:PLOT 100,260,5:v=8:GOSUB 540:MOVER -4,-8:FILL 0:PLOT 136,
156,5:v=6:GOSUB 540:PLOT 80,230:v=8:GOSUB 540:PLOT 68,242:v=17:GOSUB 540:PLOT 25
6,272:v=12:GOSUB 540:MOVER 4,4:FILL 8:MOVE 76,226:FILL 8
720 PLOT 112,308,5:DRAWR 12,0:DRAWR -4,-16:DRAWR 4,16:DRAWR 20,8:PLOT 164,296:DR
AWR 0,-8:DRAWR -16,-40:DRAWR -12,16:PLOT 160,160:DRAWR 0,58:DRAWR 8,-4:PLOT 100,
276:FOR w=1 TO 3:DRAWR 4,0:MOVER -4,2:NEXT:RETURN
730 DATA -16,-16,-12,-4,-16,0,16,-8,8,0,16,12,8,8,-4,8,0,40,-8,20,0,32,-12,-4,-8
,0,-8,2
740 DATA -8,-20,-16,-12,-8,0,-8,4,4,8,4,-4,8,4,12,24,4,28,8,16,12,16,12,8,4,0,12
,12,16,0,4,-4,8,0,12,-12,0,-8,40,4,16,0,20,-8,24,-32,8,-28,4,-8,0,-32,-8,-16,0,-
68,-24,0,0,60,-20,-8,-20,0,-16,6,0,-54,-8,0,0,-4,-20,0
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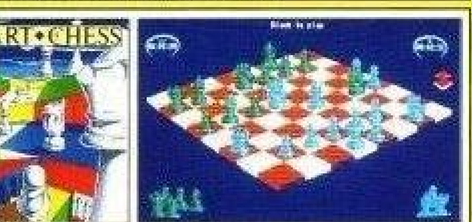
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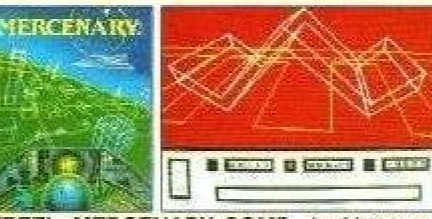

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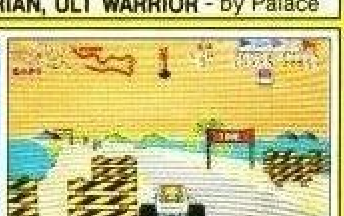
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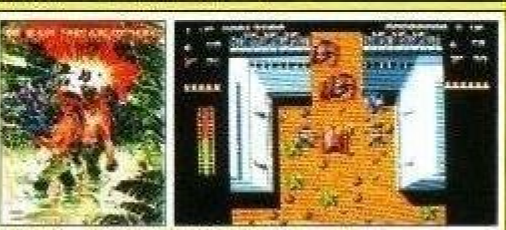


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It is almost inevitable that at some stage the competent Basic programmer will turn his attention to machine code. The promise of speed, compactness of code and even the prospect of designing custom EPROMs soon becomes too much to ignore and the first tentative steps in assembly language programming are taken.

That is a very delicate time, because a bad experience with an early program can soon deter the beginner from machine code for life. Having a good book which lists many examples helps but in the long term a good assembler will save a good deal of bloodshed.

What makes on assembler better than another? What is an assembler anyway? Is machine code not just machine code?

Machine code is the language microprocessors speak and it was never designed for humans to use. It consists of numbers, each representing a simple function, such as 'Add two values'. Each microprocessor on the market uses a different machine code, which makes things even more difficult. At any large computer club you will find Z-80, 6502 and 68000 enthusiasts, all arguing that their particular processor is the best and all having good reasons for thinking so.

Although the exact details of programming varies from processor to processor, the principles remain the same and, once thay are learned, moving to a different system is a relatively painless process.

To make life easier, various translation programs have been written in machine code. One of the most popular is Basic, which was designed in the 1960s to allow beginners to use computers. Because each Basic statement must be converted to machine code before it can be executed, speed is not at a premium.

Apart from several notable exceptions, all home computers have a Basic program, usually on ROM and available from switch-on. A 'standard' for Basic is impossible, because each new computer available has new features, each requiring new commands to control them. A case in point is the Locomotive Software Basic 'sound' command. Trying to get this command to work on a Spectrum or a Commodore is hopeless.



An alternative to Basic and other high-level languages including Pascal, C and possibly Forth, is assembly language, in which case each machine code function is represented by a single, almost-English world called a mnemonic. Thus with a Z-80 processor, like the one in CPCs, to add 42 to the contents of the internal accumulator register, instead of writing 'C6 2A', you would write "ADD A,42".

The program which translates assembly language mnemonics to machine code is called an assembler. For the Amstrad range of micros alone there are many assemblers

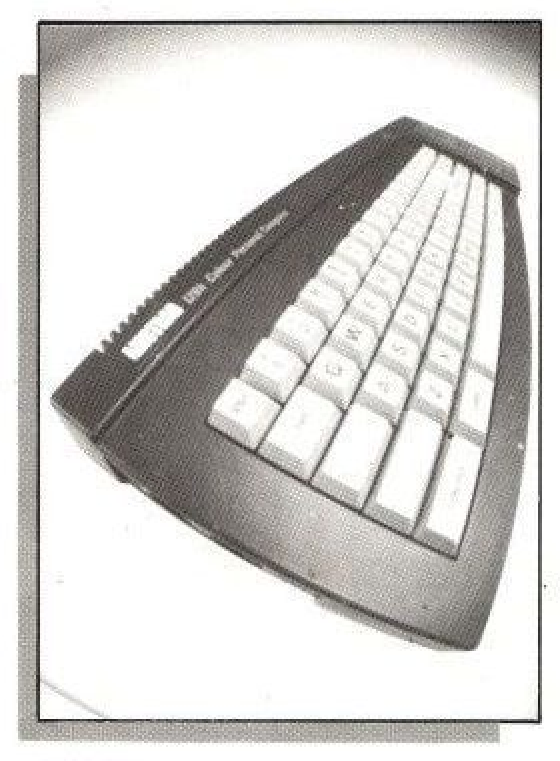
John Kennedy leaps into action with solutions galore. This month machine code, the ins and outs; assemblers, translators to befriend and understand and the importance of logical thought and extreme patience.

available, each with its own little quirks. Of course, you still need to know what is an internal accumulator register and for that you should consult one of the many books or magazine articles available. It cannot be emphasised sufficiently that the beginner should acquire an assembler if he is in any way serious about learning machine code.

Programs written in machine code are faster and more compact than their Basic counterparts. All commercial games are written in code. Operating systems, compilers, assemblers and word processors are written in code. Any program in which speed is important, or in which large amounts of memory are involved, must be written in code to be efficient.

An assembler converts a list of mnemonics, called the SOURCE file, into machine code, the OBJECT file. With an operating system such as CP/M, the source file is a standard ASCII file and the object code is another disc file in a different format, usually either *.HEX or *.REL. Those object files must be put through another program to produce executable machine codes. The programs ASM.COM and LOAD.COM are supplied on the CP/M system discs with the CPC disc computers for this purpose.

With simpler systems the source file is usually typed into an editor program and, with it still in memory, the assembler is evoked. The resultant object code is sent directly to another section of memory where it may be executed or saved to tape or disc. As this technique involves four files in memory at once – the editor program, the assembler program, the source file and the object data – things become rather squashed when working with larger programs.



Old faithful

Putting the editor and assembler programs on ROM eases things, as does using the disc or tape to store the source code and reading it in a line at a time for assembly.

Apart from the obvious advantages of not needing to remember all the machine code numbers and their related functions, an assembler helps in other ways. One of the most useful features is the concept of 'labels'. Imagine that you needed to call a routine at hex address & BD5A several times in your program. Think how much better it would be if you could refer to it as a simple English name, such as PRINT A CHAR instead of the hex number.

An assembler will do this for you. It will also calculate jump addresses, so you do not have to worry about counting the number of bytes your 'JR' – jump relative – instruction uses. The list of these labels and their linked hex values can all be listed after assembly if you wish.

Assemblers will also make saving and loading files much easier and some will even make sure your object code is not over-writing something important accidentally.

A 'monitor' is a special program which is sometimes incorporated into the assembler but is strictly a program in its own right. It provides various house-keeping facilities, such as moving round large blocks of memory or, more usefully, allows the testing of machine code programs by means of breakpoints and single-stepping.

Breakpoints are special mnemonics you put in your source code and, when the program is assembled and run, the contents of all the registers will be displayed. Single-stepping is similar, except that each machine code instruction in turn is executed, with the register contents displayed each time. Monitors are very useful for the beginner, as they show what is happening at any time.

There are many assembler packages available for the CPC range but we concentrate on those not operating under CP/M but AMSDOS. It is unlikely the newcomer would survive a head-on confrontation with CP/M without permanent mental scarring.

All assemblers have a set of pseudo-mnemonics or directives. They are special instructions which, although not Z-80 assembly language, are treated as such by the computer. As there is no real standard set of directives, each assembler uses its own and this can cause problems for the beginner. Table one lists the various directives and their meaning.

Another difference between assemblers is their speed of operation. This may not be apparent for short programs but when you are assembling your 16K game for the umpteenth game, a slow assembler will waste a good deal of time.

A reasonable assembler is one which will make programming in assembly language as easy as

possible. Disc-based computers will also make things less troublesome but it is still possible to learn how to program using the simplest of asemblers and a tape recorder. The important skills are logical thought and extreme patience.

Table 1. Assembler directives.

ORG xxxx, ORIGIN xxxx

xxxx is the address where the object code is to be stored. Most asemblers will also allow a second address to be specified. In this case the first address is where the code THINKS its going, and the second address is where it is going. This is useful if you are writing a program where the location of the machine code is important but it cannot be placed there at assembly time for one reason or another – e.g., the assembler or source code already occupies that address.

Examples

ORG &4000

Store the object code from address &4000 onwards.

ORIGIN &4000, &8000

Store the object code at address &8000 onwards but assembled to run at &4000. Obviously to execute it, it must be saved and re-loaded at the correct (&4000) address.

EQU, EQUATE.

Assign an address to a label. A label can replace any 16-bit number. Unfortunately, each assembler has its own likes and dislikes concerning labels. Some allow any character or number, some limit the length to six characters. Labels can also be inserted anywhere in the source code to represent an address.

Examples:

ASCII for Asterisk EQU 42

TXTOUT EQUATE &BB5A

```
      ld b,10
.loop call print-number
      djnz loop
```

BYTE, DB, DEFB.

Store a single byte or an ASCII string in byte form in memory. Several items may be separated by commas.

Examples:

db 10
byte "Hello mother",&ff

WORD, DW, DEFW.

Store a two-byte value in memory.

Example:

dw &c000,&c050,&c0a0

RMEM, DS, DEFS.

'Reserve Memory' or 'Data Storage'. The value following this directive specifies how many bytes are to be reserved. On some assemblers an optional second parameter allows the reserved memory to be set to a certain value.

Examples:

DS 100

Set aside 100 bytes.

RMEM 100,42

Set aside 100 bytes, all with the value 42.

END, STOP

A marker to indicate the end of the source code.

DUMP, LIST

Produce a list of the labels used in the program.

Most assemblers have many more directives, allowing conditional assembly and control of printer output. Note also that 'END' and 'STOP' may mean different things to different programs, as may 'DUMP' and 'LIST'.



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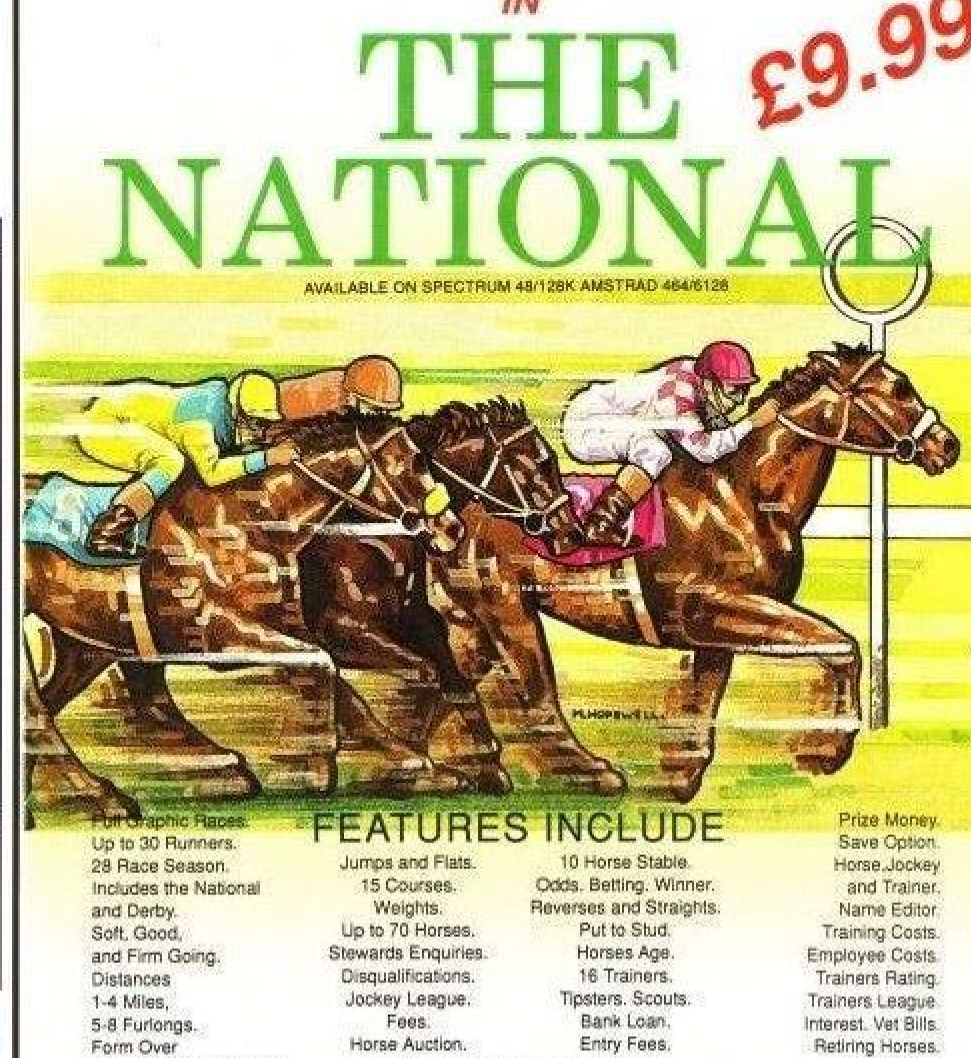
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```
750 CLS #1:RESTORE 760:PEN #1,3:FOR w=13 TO 16:LOCATE #1,4,w:PRINT #1,CHR$(143);
:NEXT:LOCATE #1,3,16:PRINT #1,CHR$(168);:LOCATE #1,5,16:PRINT #1,CHR$(169);:PLOT
 144,192,15:v=12:GOSUB 540:MOVER 0,16:FILL 15:RETURN
760 DATA -80,0,48,48,-32,0,48,48,-32,0,48,48,48,-48,-32,0,48,-48,-32,0,48,-48,-8
0,0
770 CLS #1:RESTORE 790:PLOT 48,240,6:v=4:GOSUB 540:MOVER 0,-8:FILL 9:PLOT 32,224
:DRAWR 32,12:PLOT 48,240,5:v=18:GOSUB 540:MOVER 16,16:FILL 8:PLOT 120,254:v=6:GO
SUB 540
780 PLOT 72,256:DRAWR -2,0:DRAWR 0,4:DRAWR 2,0:DRAWR 0,-4:PLOT 128,166,1:DRAWR 0
,-36:DRAWR -16,0:MOVER 32,0:DRAWR -16,0:DRAWR -12,-12:PLOT 144,166:DRAWR 0,-28:D
RAWR -16,0:MOVER 32,0:DRAWR -16,0:DRAWR -12,-12:RETURN
790 DATA -16,-16,32,0,0,16,-16,0,0,16,8,16,16,8,16,0,16,-8,8,-16,32,-16,32,0,88,
32,8,0,-96,-96,-16,-8,-48,0,-16,8,-16,16,-16,32,-4,12,-12,4,0,-14,16,-32,16,-8,1
6,0,32,16,16,36
800 CLS #1:RESTORE 820:PLOT 160,112,15:v=10:GOSUB 540:MOVER 4,4:FILL 15:PLOT 168
,112:v=14:GOSUB 540:MOVER 4,0:FILL 15:PLOT 160,112:v=14:GOSUB 540:MOVER -4,0:FIL
L 15
810 PLOT 164,256,1:v=28:GOSUB 540:MOVER 8,0:FILL 11:MOVER -20,0:FILL 11:PLOT 124
,352:v=5:GOSUB 540:MOVER -8,0:FILL 11:RETURN
820 DATA 0,112,-4,16,-8,16,-4,4,40,0,-4,-4,-8,-16,-4,-16,0,-112,-8,0,12,12,16,8,
16,12,16,20,16,28,16,16,16,4,-16,4,-16,0,-16,-8,-24,-16,-16,-16,-16,-32,-4,-16,-
12,12,-16,8,-16,12,-16,20,-16,28,-16,16,-16,4,16,4,16,0,16,-8,24,-16,16,-16,16,-
32,4,-16
830 DATA 0,8,-4,12,-4,20,-8,28,-12,16,-16,16,-8,4,-8,0,4,-12,4,-40,4,-20,12,-16,
16,-12,16,-4,8,0,16,4,16,12,12,16,4,20,4,40,4,12,-8,0,-8,-4,-16,-16,-12,-16,-8,-
28,-4,-20,-4,-12,16,8,16,4,16,0,16,-4,16,-8
840 CLS #1:RESTORE 860:PLOT 116,252,11:v=18:GOSUB 540:MOVER -4,-4:FILL 11:PLOT 1
16,252,6:v=18:GOSUB 540:MOVER 4,0:FILL 6:FOR x=0 TO 2 STEP 2:PLOT 136+x*22,228+x
,11:FOR w=1 TO 4:DRAWR 8,0:MOVER -4,-2:NEXT:NEXT:PLOT 192,256,3:v=5:GOSUB 540
850 PLOT 208,248,5:FOR w=1 TO 3:DRAWR 4,0:MOVER -4,-2:NEXT:PLOT 220,230:DRAWR -1
6,-8:MOVER 24,8:DRAWR -16,-8:PLOT 236,240:DRAWR 16,8:MOVER -16,-12:DRAWR 16,8:RE
TURN
860 DATA -12,-4,-20,-4,-12,-8,-8,-16,0,-8,4,-8,4,-4,8,-4,12,0,16,4,-16,-2,-12,0,
-12,8,0,16,8,14,32,8,12,0,-4,8,12,16,8,8,12,4,8,0,12,-4,16,-8,8,0,-4,8,8,0,40,-4
0,12,-8,-56,0,-12,4,-24,-2,-8,-2,-16,0,-8,4,-8,18,-8,4,-4,-4,0,-6,4,-4,8,0
870 CLS #1:RESTORE 890:PLOT 128,272,3:v=27:GOSUB 540:MOVER 8,0:FILL 6:PLOT 112,3
20:v=4:GOSUB 540:MOVER -16,0:FILL 6:PLOT 164,320:v=4:GOSUB 540:MOVER 16,0:FILL 6
880 PLOT 132,276,5:v=8:GOSUB 540:MOVER -8,0:FILL 1:FOR w=1 TO 9:READ x,y:MOVER x
,y:READ x,y:DRAWR x,y:NEXT:FOR w=0 TO 24 STEP 24:PLOT 124+w,312:DRAWR 0,2:DRAWR
2,0:DRAWR 0,-2:DRAWR -2,0:NEXT:RETURN
890 DATA -16,8,-8,16,0,16,16,16,32,0,16,-16,0,-16,-8,-16,-16,-8,56,-24,0,-16,-12
,0,-28,8,0,-16,32,-64,-16,-8,-16,8,-24,48,-24,-48,-16,-8,-16,8,32,64,0,16,-28,-8
,-12,0,0,16,56,24
900 DATA -8,8,0,8,16,0,8,-8,8,8,0,8,-16,0,-8,-8,-16,8,0,-24,16,8,8,0,16,-8,0,24,
-16,-8,-8,0,8,0,0,-8,8,0,0,8,-8,20,8,0,-8,2,8,0,-8,2,8,0,-8,2,8,0,-4,-8,0,-8,-12
,8,12,-8,0,0,12,8
910 CLS #1:RESTORE 920:PLOT 176,160,5:v=19:GOSUB 540:PLOT 184,192:v=13:GOSUB 540
:MOVE 160,168:FILL 2:MOVE 232,240:FILL 13:MOVE 160,240:FILL 1:MOVE 192,176:FILL
0:RETURN
```

```
920 DATA -40,0,-32,16,-20,20,-16,32,0,32,16,32,20,20,32,16,40,0,32,-16,20,-20,16
,-32,0,-32,-16,-32,-20,-20,-32,-16,8,32,20,20,32,8,-20,0,-32,8,-24,24,-12,24,-4,
24,0,24,8,8,24,0,24,-4,24,-12,24,-24,8,-32,0,-20
930 CLS #1:RESTORE 960:PLOT 80,152,8:v=22:GOSUB 540:MOVER 8,8:FILL 0:PLOT 160,20
8,5:v=4:GOSUB 540:PLOT 100,320:FOR w=1 TO 3:DRAWR 72,0:MOVER -72,2:NEXT
940 PLOT 112,320:DRAWR 0,48:DRAWR 48,0:DRAWR 0,-48:MOVER -8,8:FILL 5:PLOT 116,26
4,1:v=8:GOSUB 540:MOVER 4,4:FILL 1:PLOT 152,264,5:DRAWR 0,12:PLOT 120,296:DRAWR
8,-8:DRAWR 16,0:DRAWR 8,8
950 FOR w=0 TO 24 STEP 24:PLOT 124+w,312:DRAWR 2,0:DRAWR 0,-2:DRAWR -2,0:DRAWR 0
,2:NEXT:PLOT 132,298:FOR w=1 TO 4:DRAWR 8,0:MOVER -8,2:NEXT:FOR w=0 TO 48 STEP 2
4:PLOT 132,200+w:FOR x=1 TO 4:DRAWR 8,0:MOVER -8,2:NEXT:NEXT:RETURN
960 DATA 0,64,16,32,16,16,16,8,-16,8,-8,16,0,16,8,16,48,0,8,-16,0,-16,-8,-16,-16
,-8,16,-8,16,-16,16,-32,0,-64,-16,-8,-32,-8,-16,0,-32,8,-16,8,-8,8,0,8,16,0,40,-
80,0,12,48,0,16,-8,16,0,0,-12,-20,0,-12,8,-48,0
970 CLS #1:RESTORE 1000:PLOT 138,332,1:v=4:GOSUB 540:MOVER -4,-12:FILL 1:PLOT 13
8,356,6:DRAWR 0,-172:PLOT 140,356,4:v=4:GOSUB 540:MOVER 4,-4:FILL 4:PAPER #1,1:P
EN #1,0:LOCATE #1,3,10:PRINT #1,"6";
980 PLOT 72,148,8:v=4:GOSUB 540:MOVER 12,12:FILL 8:PEN #1,2:LOCATE #1,1,15:FOR x
=1 TO 3:PRINT #1,CHR$(22)+CHR$(1)+CHR$(170)+CHR$(171);:NEXT:PRINT #1,CHR$(170);:
LOCATE #1,1,16:PRINT #1,CHR$(22)+CHR$(0)+STRING$(7,CHR$(143));
990 PAPER #1,14:RETURN
1000 DATA -100,-140,190,0,-90,104,0,36,32,0,0,-16,-32,0,0,16,-24,36,180,0,-24,-3
6,-132,0
1010 CLS #1:FOR z=0 TO 132 STEP 132:RESTORE 1030:PLOT 64+z,204,5:v=6:GOSUB 540:M
OVER 4,-4:FILL 5:NEXT:PLOT 40,204:v=8:GOSUB 540:PLOT 70,244:v=4:GOSUB 540
1020 MOVER 68,0:v=4:GOSUB 540:MOVER 0,-16:FILL 2:PLOT 126,276:DRAWR 0,-72:PLOT 1
36,236:DRAWR 8,0:RETURN
1030 DATA 0,-4,8,-8,16,0,8,8,0,4,-32,0,0,24,48,48,80,0,32,-32,48,0,16,-16,0,-24,
-224,0,48,0,0,24,-24,0,-24,-24,0,24,24,0,24,-24,-48,0
1040 CLS #1:RESTORE 1070:PLOT 72,344,5:FOR w=1 TO 8:READ x,y:DRAWR x,y:NEXT:MOVE
R 4,12:FILL 0:MOVER -16,0:FILL 10:FOR w=0 TO 6:PLOT 192+w*8,128+w*8:DRAWR 0,176:
DRAW 74+w*2,346+w*2:NEXT:LOCATE #1,3,8:PAPER #1,10:PEN #1,15:PRINT #1,CHR$(1)+CH
R$(12)
1050 LOCATE #1,4,13:PRINT #1,CHR$(1)+CHR$(12):PLOT 104,282,9:GOSUB 1060:PLOT 136
,202:GOSUB 1060:PEN #1,1:LOCATE #1,3,7:PRINT #1,CHR$(22)+CHR$(1)+CHR$(238):LOCAT
E #1,4,12:PRINT #1,CHR$(238)+CHR$(22)+CHR$(0):PAPER #1,14:RETURN
1060 FOR w=1 TO 4:DRAWR 12,0:MOVER -12,-2:NEXT:RETURN
1070 DATA 112,-48,0,-176,-112,48,0,176,16,16,160,0,0,-176,-64,-64
1080 CLS #1:RESTORE 1090:PLOT 48,160,3:v=15:GOSUB 540:MOVER 0,-8:FILL 6:MOVER -6
4,0:FILL 6:PLOT 112,146,0:v=6:GOSUB 540:MOVER 16,16:FILL 0:PLOT 136,256,3:DRAWR
0,16:PLOT 128,272,6:v=7:GOSUB 540:MOVER 0,16:FILL 9:RETURN
1090 DATA 32,-32,32,-16,48,0,64,32,32,24,0,24,-16,8,-16,-8,0,-32,-64,-16,-48,0,-
64,16,64,16,48,0,64,-16,0,118,16,-8,16,0,16,8,0,-118,-48,0,-16,16,0,16,32,32,8,1
6,0,-64,-8,-16,-16,0
1100 CLS #1:RESTORE 1110:PLOT 72,328,3:v=4:GOSUB 540:MOVER 16,0:FILL 1:PLOT 192,
208,6:v=3:GOSUB 540:MOVER 16,0:FILL 6:PLOT 224,192,1:DRAWR 4,-4:RETURN
1110 DATA 120,-120,16,16,-120,120,-16,-16,32,-16,-16,32,-16,-16
1120 CLS #1:RESTORE 1130:PLOT 80,304,2:v=11:GOSUB 540:MOVER -16,0:FILL 0:MOVER 0
,-16:FILL 10:PLOT 176,280:v=7:GOSUB 540:MOVER 0,12:v=7:GOSUB 540:MOVER 12,12:FIL
L 10:RETURN
```

```
1130 DATA 0,-112,32,-8,32,0,32,8,0,112,-32,-8,-32,0,-32,8,32,8,32,0,32,-8,8,8,16
,0,16,-16,0,-32,-16,-16,-16,0,-8,8,8,-8,16,0,8,8,0,24,-8,8,-16,0,-8,-8
1140 CLS #1:RESTORE 1160:PLOT 80,236,2:FOR w=1 TO 4:READ x,y:DRAWR x,y:NEXT:MOVE
R 4,4:FILL 2:PLOT 96,236,0:FOR w=1 TO 28:READ x,y:DRAWR x,y:NEXT:MOVER 0,4:FILL
0:PLOT 88,236,1:FOR w=1 TO 28:READ x,y:DRAWR x,y:NEXT:MOVER 0,4:FILL 1
1150 PLOT 72,236,5:FOR w=1 TO 5:READ x,y:DRAWR x,y:NEXT:PLOT 64,120,3:FOR w=1 TO
 8:READ x,y:DRAWR x,y:NEXT:MOVER 4,4:FILL 6:RETURN
1160 DATA 164,0,0,116,-164,0,0,-116,56,40,0,-40,20,0,0,40,56,-40,16,0,0,16,-56,3
2,56,0,0,20,-56,0,56,32,0,16,-16,0,-56,-40,0,40,-20,0,0,-40,-56,40,-16,0,0,-16,5
6,-32,-56,0,0,-20,56,0,-56,-32,0,-16,16,0,68,48,0,-48,12,0,0,48,68,-48,8,0,0,8,-
64,44,64,0,0,12
1170 DATA -64,0,64,44,0,8,-8,0,-68,-48,0,48,-12,0,0,-48,-68,48,-8,0,0,-8,64,-44,
-64,0,0,-12,64,0,-64,-44,0,-8,8,0,172,0,0,116,-172,0,8,0,0,-116,8,0,0,240,12,0,-
12,4,-8,0,-12,-4,12,0,0,-240
1180 CLS #1:RESTORE 1190:PLOT 96,320,5:v=14:GOSUB 540:FOR w=1 TO 4:PLOT 160-w*2,
144+w:DRAW 212,144+w:NEXT:PLOT 96,152:DRAWR 36,0:MOVER -8,-2:FILL 5:MOVER 0,16:F
ILL 1:RETURN
1190 DATA 48,0,0,-120,4,-16,24,-10,20,-2,8,-2,8,-8,0,-16,-48,0,-28,8,-8,-8,-24,0
,-4,8,0,164
1200 CLS #1:RESTORE 1210:PLOT 96,272,2:v=8:GOSUB 540:MOVER -4,-8:FILL 10:MOVER -
16,0:FILL 8:PLOT 136,272,2:DRAWR 0,-112:FOR z=0 TO 40 STEP 40:RESTORE 1220:PLOT
112+z,284:v=6:GOSUB 540:NEXT:RETURN
1210 DATA 0,-112,40,0,64,40,0,112,-40,0,-64,-40,40,0,64,40
1220 DATA 0,28,4,8,8,12,8,0,8,-8,0,-24
1230 CLS #1:RESTORE 1240:PLOT 144,204,2:v=10:GOSUB 540:MOVER 0,4:FILL 0:RETURN
1240 DATA 60,-40,-24,64,60,36,-72,0,-24,64,-24,-64,-72,0,60,-36,-24,-64,60,40
1250 CLS #1:PLOT 80,176,1:DRAW 160,304:DRAW 240,176:DRAW 80,176:MOVER 8,8:FILL 0
:RETURN
1260 CLS #1:PLOT 80,176,3:DRAW 80,304:DRAW 240,304:DRAW 240,176:DRAW 80,176:MOVE
R 4,4:FILL 0:RETURN
1270 CLS #1:RESTORE 1280:PLOT 176,160,8:v=16:GOSUB 540:MOVER 4,4:FILL 0:RETURN
1280 DATA -40,0,-32,16,-20,20,-16,32,0,32,16,32,20,20,32,16,40,0,32,-16,20,-20,1
6,-32,0,-32,-16,-32,-20,-20,-32,-16
1290 CLS #1:RESTORE 1300:PLOT 96,144,7:v=12:GOSUB 540:MOVER 0,4:FILL 0:RETURN
1300 DATA -32,32,64,64,-64,64,32,32,64,-64,64,64,32,-32,-64,-64,64,-64,-32,-32,-
64,64,-64,-64
1310 CLS #1:PLOT 160,336,5:DRAWR 0,-160:RETURN
1320 GOSUB 1380:FILL 1:RETURN
1330 GOSUB 1380:FILL 2:RETURN
1340 GOSUB 1380:FILL 15:RETURN
1350 GOSUB 1380:FILL 9:RETURN
1360 GOSUB 1380:FILL 5:RETURN
1370 GOSUB 1380:FILL 0:RETURN
1380 CLS #1:RESTORE 1390:PLOT 36,224,5:FOR w=1 TO 36:READ x,y:DRAWR x,y:NEXT:MOV
ER 4,4:RETURN
1390 DATA 0,32,16,0,0,32,16,0,0,32,32,0,0,16,32,0,0,16,32,0,0,-16,32,0,0,-16,32,
0,0,-32,16,0,0,-32,16,0,0,-32,-16,0,0,-32,-16,0,0,-32,-32,0,0,-16,-32,0,0,-16,-3
2,0,0,16,-32,0,0,16,-32,0,0,32,-16,0,0,32,-16,0
```



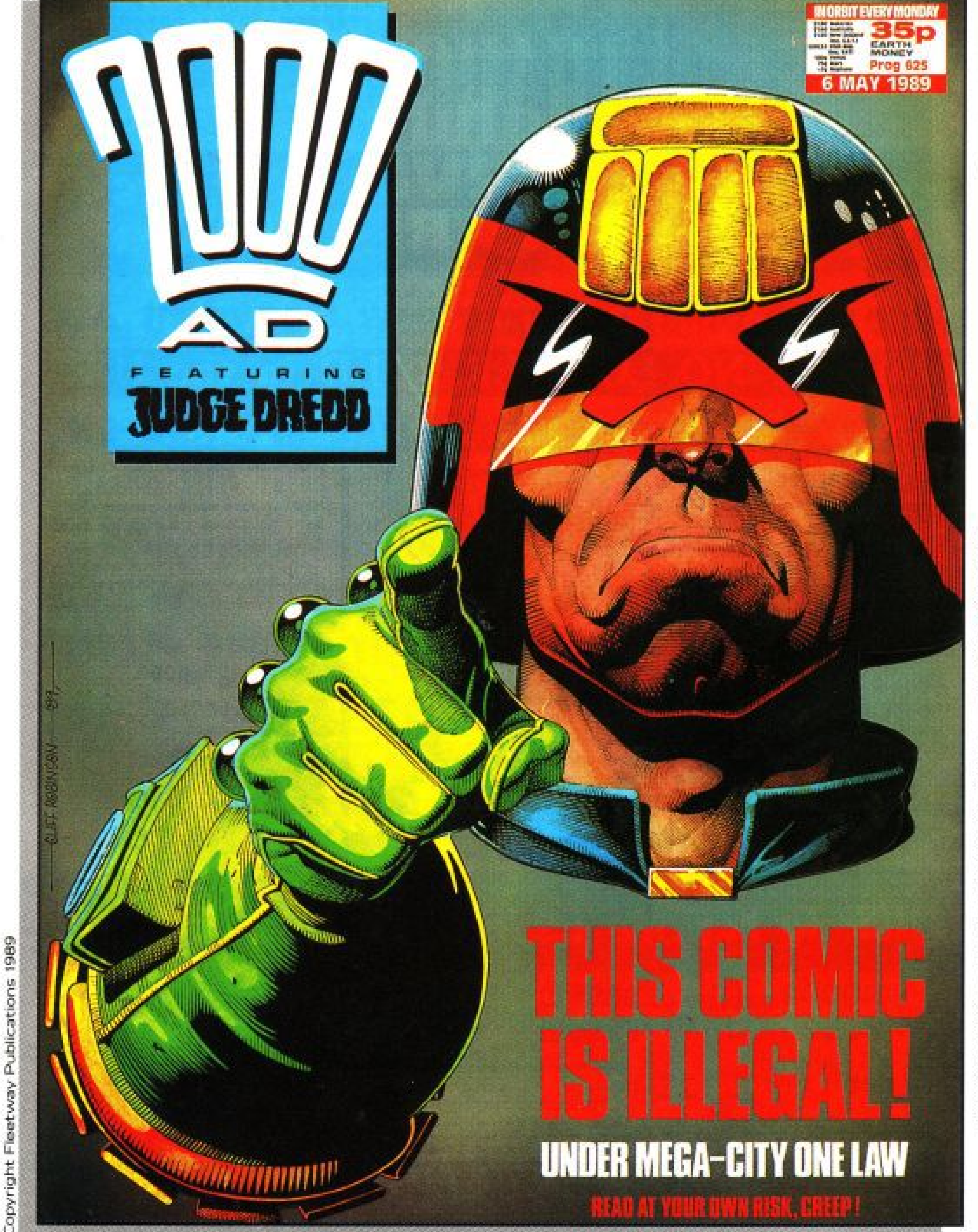
PUT A LITTLE PUNCH IN YOUR CPC WITH THE HEROIC ACTIONS OF THE CULT COMIC CHARACTERS

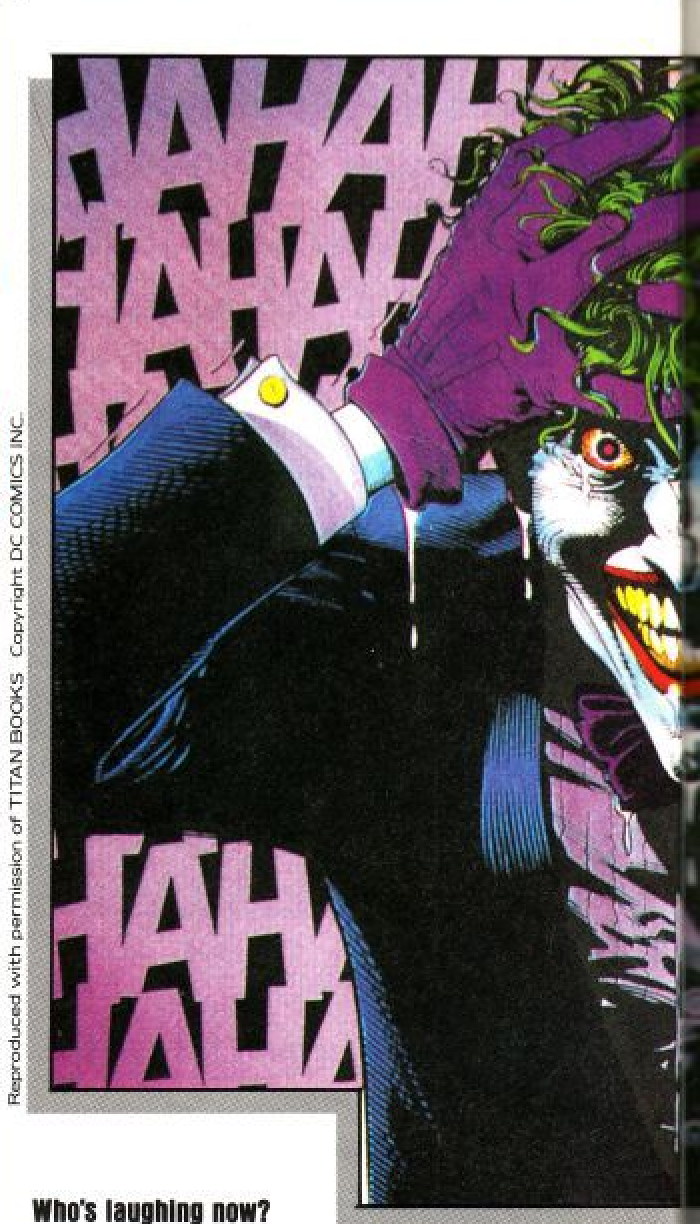
It was once said that there is one industry where the produce is more valuable after purchase. It also shows the highest rate of article value in the short term than any other – even the artwork or antiques business. It is, of course, the wacky world of comics.

The Cult, the biggest batman comic of 1988, retailed for £2.50 early in the year. Less than a year later it has been seen in some comic shops around the £7.50 mark, making the comic 200 percent more valuable in a relatively short time. Some comics appreciate even faster.

That is no surprise because at the moment the world seems to have gone Batman crazy. With the Batman film, the Batman series re-runs, and an influx of Batman-related consumer items flooding the market in the last two years – as well as the *Batman* computer

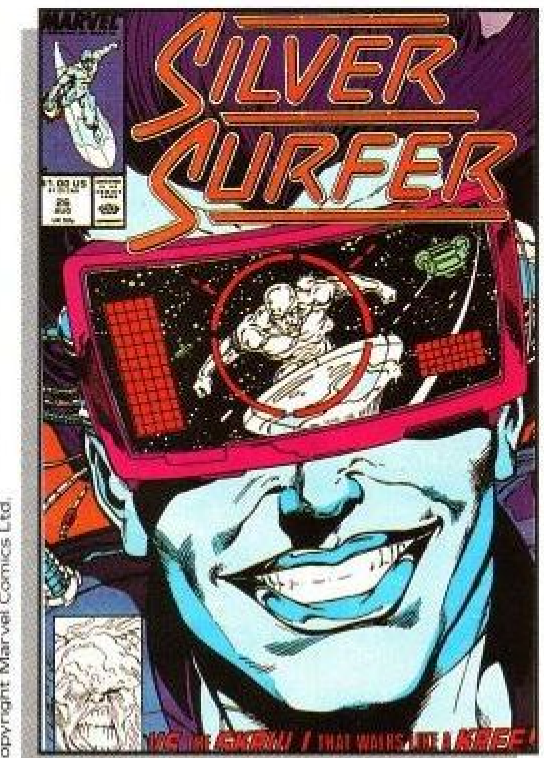






Who's laughing now?





Surf's up with the silver surfer.





The world of comics bears witness to strange deeds of heroes past, present and future.
As the conversions continue more and more the fate of these champions rests in your hands.

games – this popularity rise can all be credited to one man.

Frank Miller is a genius. His most famous comic – *The Dark Knight Returns* – can only be described as a masterpiece. It took a faded has-been in tights and a cape and turned him into a gun-wielding, arm-breaking psychopath. The strange thing is it did not change Batman's – or Bruce Wayne's – identity; it just brought it more to light. That is the inspiration for the Batman movie – starring Michael Keaton and Jack Nicholson – which is a very wise move, as comics are an institution in the U.S.

Batman is not the only comic strip hero in the eyes of the public at the moment. The great British comic writer Alan Moore's Watchmen caused such a ripple in the comic market two years ago that we are still buying the merchandising; needless to say the original print run of the series is now worth a small fortune. Superman is still going strong and is about to star in his fifth film and even Judge Dredd from Britain's *2000AD* is doing very well in the States, almost as well as in the U.K.

We cannot dismiss the other side of the American comic industry, the *Marvel* comics. They are responsible for Spiderman, soon to be a big budget picture; The Punisher, also soon to be a big budget picture; Daredevil, and most important, The Uncanny X-Men.

Softek, on subsidiary label The Edge, has recently announced a deal with Marvel comics to convert a great super-hero troupe to computer game format. This is not a new idea, nor will it be last time it will be seen. At the moment Virgin Mastertronic is working on the *Silver Surfer* game, a conversion of one of the most cult super-heroes of all time.

The list of comic-strip pixelisation goes far back to when licensing was not yet all the rage. The first appeared in the young years of the ZX Spectrum – even before it was an Amstrad machine – based on the then popular Strontium Dog from 2000AD. Adventure International followed with three games based on Marvel characters Spiderman, The Incredible Hulk and The Fantastic Four. On the CPC the first Batman game was an immense success for Ocean Software.

2000AD has had an incredible life

story as a comic. Founded in 1977 and now rumoured to have a 400,000 dedicated readership, it has also been the major supplier of comic licences. Judge Dredd made his appearance, although not too spectacularly, as did Slaine and Nemesis the Warlock, and even The Rogue Trouper wandered round somewhere on the brink of obscurity. It was when Piranha Software acquired the rights to *Judge Death* and *The Ballard of Halo Jones* that things started to look up, or at least they did until Piranha bit itself to death.



Although Judge Death seems to have gone to another dimension, Halo Jones is still rumoured to be coming our way. This unfortunately seems to be a slightly hopeful judgment on behalf of most as, when questioned, Mike Lewis, the programmer of the game for defunct Piranha, claims that the Interceptor Group – the house which now has the rights – has not made contact with him for some time and now seems unlikely to do so.

DC also has a fair amount of games to its credit, Batman being just one. The newer Batman game which proved so popular at Christmas, another Batman game





based on the film coming next Christmas, and a number of others all seem to have sold well. There have been two *Superman* games but, strangely, none featuring that busty amazon, *Wonder Woman*.

More obscure games in the genre are from all kinds of places. The *Andy Capp, Snoopy, Garfield,* and *Rupert the Bear* are all from newspapers. *Roy of the Rovers* and *Gary Lineker's* Hotshot are titles of boys' comics in the U.K. – now amalgamated into one, of course. The most peculiar must be the *Oink* game, where you must get your comic out on time by playing several sub-games.

This all goes to show that comics can be very powerful and in an ever rapidly-growing market new titles, and therefore new licensing potential, is always occurring. Who needs arcade games when you can have The Mighty Thor to back up your piece of software?



It does not stop there. It can work both ways. The comic *Shatter* is totally drawn on a computer system and in the new *Eagle* there is a story entitled *The Computer Warrior* where a child is occasionally sucked into a computer to play games for his life, all of which are manufactured by U.S. Gold.

If you wander past a sweet shop or a specialist comic shop and you would never have thought to pick up a Teenage Mutant Ninja Turtles previously, you may be surprised. The world of computer games is not so different from this one and the proof is surely in the pudding. I cannot wait until they bring out the *Viz* game.

APPLICATION ADVICE

David Dorn tackles this month's problems and offers words of wisdom.



Printers and printer drivers seem to cause more problems than any other peripherals you can use with a CPC with the possible exception of RS232C linked devices. In this month's batch of letters there is more than one printer problem.



The first from D. Heath, of Wincham, Northwich. He says: "I have a Star LC-10 colour printer attached to my 464. Every time I draw a colour picture on-screen with *AMX Art* and dump it to the printer the colours on the screen do not come out in colour on the printer." He wants to know if there is another art program which will use the capabilities of his LC-10 to the full, instead of printing in monochrome.

It is down to printer devices again and since the LC-10 colour is a relatively new printer, compared to the age of many of the art packages on the market, not many have colour drivers built-in. I would go so far as to say that none I have seen has a colour driver of any description, much less than one for the LC-10. All is not lost. It should be possible, given a little time and patience, to write a colour dump for your printer in Basic. I believe that there are some already available but am sure they are not for the LC-10.

ELIPTICAL CIRCLES

Geoff Marshall in Saudi Arabia has dicovered that *Mini Office II* prints ellipitical pie charts on his DMP2000 when he produces them on his 6128. He is wondering if there is any way of sliding a circle off the monitor and on to the printer without flattening it or squashing it.

This is all to do with the way MOII prints-out the screen. It is a pixel-for-pixel dump and since the pixels on the screen are higher than they are wide, the output on paper is flattened. It is is any consolation the screen dumps in the manual suffer in the same way. The only option which occurs to me is to use a Multiface 2 to capture the screen to disc and load it into *Art Studio*, which allows you to fiddle with the aspect ratio of the printed output. That way, once you have found the best parameters it should be simple.

Beyond that, diving head first into the protected MOII disc to change the code might cause more problems than it solves, since the code would need disassembling and then amending.

BEST PRINTER FACTS

Still with printers, Tony Carter of Littlehampton, West Sussex, asks about desk-top publishing packages which will produce professional-looking leaflets and the best printers to use with them. His only caveat is that whatever the printer it must be full width – i.e., 132 columns – for use with *Supercalc 2*.

The DTP package is easy; *Stop Press* is definitely the best of the bunch and, to my mind, the best quality print. It is now being distributed and supported by Database Software – 0625 878888 – and is priced at around the £50 mark without mouse. As for the printer there are so many, all with similar facilities and all at similar prices.

One thing, though, with Stop Press, a 24-pin printer does not give such good results as a 9-pin job. The Citizen 120D has given me consistently good output under Stop Press but I dislike its paper handling. The Star series seems to be good value.

MORE STOP PRESS

D. Baker, of Kimberley, Nottingham is a user of Stop Press and is having difficulty importing text produced under *Protext*. Stop Press acts on the embedded carriage returns and will not justify the text into columns, which makes for unattractive reading.

I had the same experiences and found two ways of circumventing them. The first is a matter of replacing all the single carriage returns with spaces, leaving the two carriage returns at the end of each paragraph intact. Under Protext, that is simple. Try this on a text file – your input is BOLD and the computer output is normal text:

```
>replace
FIND string:!.!.
REPLACE with: @
Options (A,B,C,G,W,n)? GAS
REPLACED <number>
```

That should replace all the paragraph ends with a commercial @ sign. Now to strip all the end of line CRs, do this:

```
>replace
FIND string: !;
REPLACE with: (Type a space here, then hit <⁴³⁵⁷⁴τ>)
Options (A,B,C,G,W,n)? GAS
REPLACED <number>
```

All that remains is to replace the '@' signs with two carriage returns. Reverse the first example – replace @ with !.!. – and each paragraph is one long line and will import into Stop Press with no bother. What it does is to make Protext ASCII files into Tasword-format files, which is what Stop Press was set up to cope with in the first place.

The second method is only of use if you are importing text into columns of known character widths. In this case, all you need to do is set





up Protext with the right margin set as if you were typing direct into the column. It is probably a little less trouble than the foregoing method but it is not nearly so flexible. With the first method, you can auto-flow text in any column width you choose and Stop Press should take care of justification.

TASDIARY PROBLEMS

Ben Butcher of Bury St. Edmunds writes to tell the Amstrad Users' Club that he has bought Tasdiary. He seems to have corrupted his disc and asks if we can tell him what is wrong and how to correct it. Since I have never seen it, I telephoned Tasman and was told to tell Butcher to send back the disc with a covering letter and it will either be replaced or re-duplicated.

MORE MOII

L.P. Parker pens the next query. He is having problems with MOII on his 464, more specificially the spreadsheet. He says: "Recently I have been working on a large spreadsheet which is well within the capabilities of the program. I have got only part of the way through it and now, when I put information into the empty cells, I get a quote saying "no room'.

A number of thoughts occur. First, he is using a disc drive on his 464, which grabs a small amount of memory from the pool. Mini Office II does not use discs as virtual memory, so all the information in the spreadsheet has to be kept in RAM. If he is getting a "no room" message it means precisely that – he has run out of RAM.

My first port of call in the search for an answer was the MOII manual. On page three it says: "The format is a table of figures, called a matrix, and it can be as large or as small as your requirement demands. It may contain any number of rows, identified by letters, and any number of columns, identified by numbers." That would make you think that a sheet of infinity x infinity would fit

> "Recently I have been working on a large spreadsheet which is well within the capabilities of the program. When I put information into the empty cells, I get a quote saying – no room."

but commonsense tells you otherwise. There is only a finite space in which the data can fit and certain things lessen the number of cells you may have filled.

Any cell containing only a number will use a maximum of three bytes. A cell containing text will take a rather larger number of bytes – one for each character and at least one for the pot. A cell containing a formula may take a byte for each character and several for the pot. So, if his spreadsheet is full of formulae and text the theorerical maximum number of cells allowed is reduced considerably.

This means that a sheet consisting only of numbers, with the absolute minimum of formulae – it has to have some formulae or there is no point to it – may have maximum dimensions of, say, 256x256 and MOII will not get close to that. If the number of formulae increases the memory in which they need to be stored, plus the memory needed to work them out, might reduce the maximum dimensions to 128x128. Add plenty of comment lines and other text and you may end up with 64x112.

First, I would suggest removing all comment lines and text from the sheet, which will free both cells and memory. Next, look very carefully at the formulae you have in the sheet. Identify any which could be placed as constants and convert them. Check for any which could be shortened or expressed in a less memory-hungry way.

Bear in mind that MOII treats formulae differently from text and numbers, so any free space it shows applies only to formulae. Text and numbers are stored separately, so although you may think that there is still plenty of room, the text and numbers variables area in memory may be full.

READER'S ADVICE

A letter from Matthew Smith of Stratford-upon-Avon, who is having difficulty re-loading saved AMX Art pictures as what he calls loading screens. He says doing so causes his 464 to re-set but without printing most of the information at the top of the screen. I assume that he refers to the copyright message and any ROM sign-on messages. I rather suspect that he is not specifying the correct load address for the files. They should be loaded to C000, using the syntax:

```
LOAD >Filename<, &C000
```

If that does not solve the problem I am stumped, since AMS has sold its CPC stuff to Database and is taking no queries on it now and Database has not had time to take the wrappers off the packages yet. Add to that the fact that ART is the only AMS package I do not have and you may understand why.

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